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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR

CHEMICAL ANALYSES OF IGNEOUS ROCKS

PUBLISHED FROM 1884 TO 1900

WITH A

CRITICAL DISCUSSION OF THE CHARACTER AND USE OF ANALYSES

BY

HENRY STEPHENS WASHINGTON

WASHINGTON
GOVERNMENT PRINTING OFFICE
1903

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LETTER OF TRANSMITTAL.

Department of the Interior,
United States Geological Survey,
Washington, D. C., March 20, 1903.

Sir: I have the honor to transmit to you a manuscript entitled "Chemical Analyses of Igneous Rocks published from 1884 to 1900, with a critical discussion of the character and use of analyses," by Henry Stephens Washington, and to recommend that it be published by the Survey as a Professional Paper. This work is primarily a compilation of chemical analyses, and is especially valuable to petrographers and chemists, for it places in one volume material gathered from a great many scattered sources. The critical discussion of the value and use of rock analyses, with comments upon methods of analysis and a review of the bearing of this mass of material upon rock classification, is also of much importance to both petrographers and chemists. The arrangement of the analyses according to the quantitative system for the classification of igneous rocks permits one to compare readily any new analysis with many others of closely allied rocks. A work of this kind is necessarily very expensive when published by a commercial house, and if so issued would be beyond the reach of many who would desire to use it. It is particularly appropriate that the Survey should publish this work, because a very large proportion of the rock analyses here included have been made in the laboratory of the United States Geological Survey, upon material which is preserved in its petrographic reference collection. The use of that collection will be greatly facilitated by this work.

Very respectfully,

Whitman Cross,
Geologist in Charge Section of Petrology.

Hon. Charles D. Walcott,
Director U. S. Geological Survey.

PREFACE.

The collection of chemical analyses of igneous rocks here presented was made during a period covering several years, for purposes of ready reference in certain lines of investigation. In view of the great value of that standard work of reference, Roth's Tabellen, and of the fact that no such collection of rock analyses has appeared since the last installment of these in 1884,[a] it was thought that an extension and completion of these along the lines of Roth's work, so as to bring them down to the present day, would be welcome to petrographers. This seemed to be the more advisable because the years that have elapsed since 1883 have witnessed a very marked increase in the number, as well as a great improvement in the quality, of chemical analyses of rocks. These years have also shown a steady increase in the importance of chemical analyses as applied to the discussion of petrological problems, and a growing tendency to use them as bases for various systems of classification which have been proposed.

The classificatory work on which I have been engaged in collaboration with Cross, Iddings, and Pirsson, the results of which have recently appeared,[b] was also a powerful incentive to the formation of the present collection. As has been stated by us, this collection has been appealed to whenever possible, as a test of our proposed system of classification, and has also formed to a large extent the basis of the roots of the magmatic names suggested.

The years embraced in the present collection are those from 1884, that of the publication of the last of Roth's Tabellen, to 1900, both inclusive. The former was selected as a starting point because Roth collected nearly all the analyses which appeared in 1883; yet some of those which he overlooked are included in this collection. The year 1900 seemed to be appropriate as the other time limit, partly for the reason that it was the closing year of the last century, and partly because in that year appeared Bulletin 168 of the United States Geological Survey, which is the latest publication embracing all the analyses of rocks made by the chemists of that organization. At the same time, since the collection is to a large extent illustrative of our proposed system of classification and nomenclature, some analyses published prior to 1884 or subsequent to 1900 that are of especial interest or importance have been included, as illustrations of the classificatory divisions, or as forming the bases of the magmatic names.

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[a] Roth, J., Beiträge zur Petrographie der plutonischen Gesteine: Sitzungsber. K. Preuss. Akad. Wiss., Berlin, 1884.

[b] Journal of Geology, Vol. X, 1902, p. 555; also, Quantitative Classification of Igneous Rocks, Chicago, 1903.

The endeavor has been made to present all analyses of igneous rocks, good, bad, and indifferent, that have been published within the time limits selected. For this purpose I have examined the most complete accessible files of all known geological survey publications, as well as those of geological and other scientific societies, the various geological journals, inaugural dissertations, etc.

It is of course impossible that all analyses published during the time given should have been collected. Some of the less well-known publications of scientific societies are inaccessible in this country, and, indeed, at the time the material was collected (1900 and 1901) the later publications of some of the surveys and societies were, for obvious reasons, not to be had here. But it is believed that the collection is fairly complete, and that it contains at any rate a record of much of the most useful and noteworthy chemical work of the seventeen years which it represents.

It is hoped that occasional appendixes will be published later, in which, if possible, many of the analyses here overlooked will appear. For this purpose I shall esteem it a favor to have my attention called to omissions, and shall be under great obligations to those who will be kind enough to send separates of publications which have been overlooked in the present collection or which may appear subsequently in journals that are accessible here with difficulty or not at all. It is to be regretted that the current reviews publish so few of the analyses contained in the papers reviewed, for these analyses are often of the greatest interest. In the present trend of petrology they are often of much more importance than the microscopical details, which are frequently cited at length.

Although great care has been taken to guard against errors in collecting the analyses, preparing the manuscript, and reading the proof, mistakes are almost unavoidable in dealing with the mass of figures represented. I can not venture to hope that they have been entirely eliminated, and can only express my regrets at their existence, and trust that my attention will be called to them—a favor which will be very highly appreciated.

The collection is strictly confined to analyses of igneous rocks. It was at one time intended to include also those of metamorphic rocks, but the delay which this plan would have involved seemed finally to render it inadvisable, though a fairly complete collection of such analyses had also been made in conjunction with those here given. Sedimentary rocks of all kinds have also been omitted, though analyses of volcanic tuffs are included. Analyses of serpentines are likewise excluded, since they are due either to the decomposition of igneous rocks, so that, as explained elsewhere, their analyses would fall under the ban imposed on such altered material, or are derived from either metamorphics or mineral masses, and hence fall outside the scope of the present collection.

It was hoped for a time that analyses of meteorites could be given; but owing to the fact that no adequate collection of the analyses of these bodies has yet been made, this would have involved a search through the voluminous and widely scattered literature published concerning them since the commencement of their study. Such a proceeding would have postponed indefinitely the appearance of this work, and therefore, as well as in view of the fact that they form the subject of special study, the project was abandoned. I am informed, furthermore, that such a collection is already being undertaken by another, so that it is to be hoped that this serious lacuna will shortly be filled.

It may seem to many petrographers who are acquainted with the chemical analysis of rocks that certain portions of this subject have been gone into with unnecessary detail, or that many truths are stated which are obvious to any one conversant with the subject. That this is true to a large extent is admitted, but it must be remembered that the greater part of the text which is devoted to this subject has been written with the nonanalytical reader in mind, to whom much of what is here given will undoubtedly prove novel. As will be evident from a perusal of the text and from a study of the analyses here presented, there are far too many petrographers to whom the principles and methods of chemical analysis are as a sealed book, and in their case I can only feel that if I have erred it has been on the side of too little explicitness or detail.

The new terms and names used are those proposed in connection with the recently published quantitative classification, and their meanings will be found in the glossary given on pages 479–483. No apology is offered for their introduction, since in many cases they are the only terms available to express the ideas which it is desired to convey, at least without the use of much longer or circumlocutory phrases, and it was desired as well to take this opportunity of making them more familiar to petrographers.

The progress of the work has been greatly facilitated by the kindness of many friends, to whom it is a pleasure to express obligations. I am especially indebted to the officials of the libraries of Yale and Columbia universities and of the United States Geological Survey, who courteously afforded me the fullest facilities in the examination of serial and other publications. Without their assistance this collection could not have been made satisfactorily complete.

I am also indebted to several friends, among whom I may mention especially Profs. J. F. Kemp and J. B. Harrison, for several unpublished analyses, which they kindly allowed me to insert in the tables. To my friends Dr. Cross, Professor

Iddings, Professor Pirsson, and Dr. Hillebrand I am grateful for many valuable suggestions and criticisms. Nearly the whole of the manuscript of the text has been submitted to my colleagues in the new classification, so that the views here expressed may be regarded, in general, as having their indorsement, and as expressing the ideas of all four.

Last, but by no means least, I must express my sense of deep obligation to the Hon. C. D. Walcott for his kindness in allowing the work to appear as a Survey publication. It is gratifying to feel that this hospitality is in part repaid by the incontestable evidence the present volume affords of the preeminent place in rock analysis that is held by the organization of which he is the Director.

Finally, I must express my regret at the delay in the appearance of the work, which is published more than two years after the limiting date of the collection. I can only plead in extenuation the pressure of other work, especially that in connection with the new system of classification, and trust that the time which has elapsed has but added to whatever worth the volume may possess.

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

By H. S. Washington.

INTRODUCTION.

In the first two or three decades of the last century, when the study of rocks as such was being differentiated from that of minerals and of rock terranes—that is, when the science of petrography was in its infancy—little attention was paid to their chemical features. It is true that a number had been analyzed, but these were for the most part rocks that were of such a character as to lead the investigator of those early days to consider them as minerals, as was the case with the first described lherzolite and wehrlite. In contradistinction to the individually well-defined minerals, rocks were regarded as merely aggregates of minerals, in presumably fortuitous combinations, and lacking that definiteness or constancy of composition in one mass or in different masses which would justify their chemical study as a whole. As, however, they became more and more the subjects of special research, beginning with the earliest investigations of Cordier,[a] a knowledge of their chemical composition assumed gradually increasing interest. The great importance of this side of the study of rocks was first clearly recognized by Abich,[b] who pointed out, as early as 1841, the necessity of a knowledge of their chemical composition for the solution of such problems as their origin, mode of formation, and connection with the interior of the earth, as well as the value of a comparison of their analyses as a proper basis for their classification and nomenclature. To him, therefore, is due the credit of introducing the chemical composition of rocks as a basis for their classification; though the good influence of this suggestion for their right understanding was largely nullified by the coincident use of the feldspars alone as one of the main factors of classification,[c] an idea which has had a deplorably retarding influence on the development of systematic petrography for many years, and which, even at the present day, holds many systematists firmly in its grasp.

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[a] Cf. Cross, Whitman, Jour. Geol., Vol. V, 1902, p. 352.

[b] Abich, H., Natur der Vulkanische Bildungen, Braunschweig, 1841, p. v.

[c] Cross, Whitman, loc. cit., p. 362.

For about thirty years after Abich's publication chemical analyses occupied a prominent position in petrographical discussions, being employed largely for the purpose of determining the mineral composition of rocks. Abich, in the work just cited, had adopted as a means to this end the ratio of the oxygen of the bases to that of the silica, and was thus enabled to calculate approximately their mineral composition, as Rammelsberg and others had also done.

A modification of this method, known as the "Oxygen-ratio" (Sauerstoffquotient), was introduced by Bischoff,[a] and was long employed for the correlation of rock analyses and for the investigation of the question whether the various oxides were present in rocks in stoichiometric proportions or not. This ratio is obtained, for any given rock, by dividing the amount of the oxygen in all the bases by that present in the silica, and was supposed to be characteristic of different broad groups. This supposition was eventually found to be unwarranted, as rocks of very diverse chemical or mineralogical characters were shown to have the same oxygen ratio. It is noteworthy that, although he himself pointed out this and other grave objections to the use of this ratio,[b] Roth gives it in connection with the separate analyses in all his tables, even in the last one, published in 1884. He explains this by saying[c] that it is done, "only in the absence of a better means of comparison, as well as to make it possible to compare the older and newer analyses."

It was also shown by Roth and others that rocks could not be referred to simple chemical formulæ; in other words, that the oxides were not present in stoichiometric proportions. This, indeed, is one of the most important of the results arrived at by Roth from a study of the analyses collected by him, and first published in 1861.

Shortly after Bischoff's suggestion of an oxygen ratio there appeared[d] Bunsen's well-known hypothesis of the formation of igneous rocks by the mixture of two supposed original magmas—the normal trachytic and the normal pyroxenic. For the application or the discussion of this hypothesis, analyses were, of course, all-important. Founded, as the hypothesis was, on limited and totally insufficient data, it had to yield to the evidence furnished by the many analyses to which it had given rise.

With the abandonment[e] of this view of the genesis of igneous rocks, and owing to the coincident introduction of the microscope in the early seventies, analyses lost much of their importance. Though they were still published, it is evident that they were, as a rule, inserted perfunctorily in petrographical writings, in obedience to custom, as ornamental embellishments. Little or no stress was laid on them, and the chief efforts of the petrographer were devoted to the elucidation of the purely mineralogical and textural characters of the rocks described.

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[a] Bischoff, G., Lehrb. Chem. Geol., Vol. II, 1849, p. 631.

[b] Roth, J., Gesteins-Analysen, Berlin, 1861, p. x.

[c] Roth, J., Beitr. Petrog. Pluton. Gest., 1869, p. 87.

[d] Bunsen, R., Pogg. Ann., Vol. LXXXIII, 1851, p. 197.

[e] Cf. Zirkel, Lehrbuch, Vol. I, 1893, pp. 658 et seq.

The microscope poured a flood of light upon the mineralogical constitution as well as the texture of rocks, and rendered easy and certain of attainment results which by the older methods, based on analysis, had been attained only with difficulty or not at all. At the same time the collapse of Bunsen's hypothesis left for the time being no general theory of rock formation and genesis in its place, Durocher's liquation hypothesis[a] and Roth's first suggestion of differentiation[b] attracting little attention. Petrographers were too busy collecting and assimilating the vast mass of facts discovered through the microscope to be able to devote much of their energies to theoretical studies.

With the opening of the last decade of the nineteenth century, however, there arose an interest in the theoretical side of petrology in contradistinction to the descriptive petrography which had hitherto prevailed since 1870. This was started by the work of Lagorio, Teall, Rosenbusch, Brögger, Iddings, and others, and since that time analyses have occupied a more and more prominent place in petrological discussions. They are no longer ornamental adjuncts, but essential parts of most petrographical publications, on which much of the discussion hangs, and from which the most important conclusions are drawn.

The crystallographic and optical properties of the constituent minerals and the details of texture are no longer the main subjects of investigation, but are finding their place with the chemistry of rocks and the broad and far-reaching studies based on this. The microscope is sharing the throne with the balance.

This is as it should be, since exclusive attention to one aspect tends always to obscure the goal toward which all science is striving—the understanding of the "how" and the "why" of things as they are—by temporarily setting up objects of interest of subsidiary importance. These subsidiary aims all have their use in advancing the progress of the science, but it must not be forgotten that they sometimes lead into very devious paths, often of overspecialization, and that it is by keeping our forces moving forward together along all the lines of approach that we shall most quickly and surely reach our destination.

THE CHARACTER OF ROCK ANALYSES.

GENERAL CONSIDERATIONS.

With the growing interest in rock analyses it is of the utmost importance that they be used intelligently, not only as to their application in theoretical discussions, but, which is of especial interest here, as regards a just appreciation of their character and applicability to the purpose in view.

It is a somewhat surprising and, it must be said, a rather saddening fact that the critical judgment of petrographers in general as regards rock analyses seems to be in abeyance or wholly lacking. There is among them now, as there seems always to have been to some extent, a tendency to place implicit confidence in the results of analytical work—to accept readily whatever figures the analyst may furnish, with scarcely ever an attempt at a critical estimate of the worth of the analysis or a comparison of it with the chemical character of the rock itself as revealed by the microscope. It seems to be taken for granted by nearly all petrographers that the analyst, like the proverbial king, can do no wrong. This applies, not to the personal good faith of the analyst, but to the analytical processes which, possibly because they belong to one of the exact sciences, are for the most part tacitly assumed by the petrographer to be infallible.

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[a] Durocher, Ann. des Mines, Vol. XI, 1857, p. 217.

[b] Roth, J., Gesteins-Analysen, 1861, p. xix.

It is noteworthy that this attitude of mind obtains, not only among beginners, but among the foremost workers in the science. There are, it is true, some instances of the application of expressed criteria in the selection of analyses in well-known papers, but in all these cases the criteria applied are few, and quite inadequate to the purpose, being confined, for the most part, to the freshness of the rock. In few cases does there seem to be any recognition of the difficulties and uncertainties of analytical work or any practical acquaintance with its methods.

It goes without saying that this way of regarding analyses is totally at variance with the best interests of the science. Analyses constitute the basis of much of the investigations and discussions with which petrographers and petrologists must occupy themselves, and it is surely not the part of wisdom to erect elaborate structures on foundations of whose stability and careful workmanship we are not assured. It will be time saved in the end, and the superstructure, however well built in itself, will have a far better chance of withstanding the ravages of time and the attacks of critics if all the rotten and unsound blocks in the foundation are removed and only the best and strongest of material retained.

A consequence of this unquestioning confidence in the results of analytical work is that it is often intrusted to a student in chemistry, one with little or no experience in the analysis of rocks, and with no appreciation of the complexities and difficulties inherent in this department of quantitative analysis. That the results furnished by such inexperienced, and to this extent incompetent, analysts should be received with the greatest caution, is a truism to anyone acquainted by actual experience with the difficulties and dangers of rock analysis. But Hillebrand[a] and Pirsson[b] have expressed so clearly and concisely the views which I hold that I can do no better than refer to them. It is certainly remarkable and significant that in petrography alone of all the sciences the most difficult and intricate work is intrusted to novices, and that their results are accepted by nearly all with the same confidence that is given to the work of an experienced person.

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[a] Hillebrand, W. F., Bull. U. S. Geol. Survey No. 148, 1897, p. 16.

[b] Pirsson, L. V., Twentieth Ann. Rept. U. S. Geol. Survey, 1900, Pt. III, p. 578.

This general laxity among petrographers as regards the quality of rock analyses is only too painfully evident in the present collection. There is to be found an astonishingly large proportion of poor work, much of it of such a character that it would seem that even a tyro in analysis would reject it as hopelessly inadequate for use. Analyses are given with summations over 103 or below 98. Analyses of leucite-basanite exist so low in alkalies that 10 or more per cent of quartz must be present, even though in the calculation all the potash is assigned to orthoclase and all the soda to albite. Analyses of rocks rich in olivine are found which show 30 per cent of alumina and only small amounts of ferrous iron and magnesia. In certain cases of alkalic rocks the alkalies have not been separately determined. Rocks with abundant ægirite contain no ferric iron, and those with sodalite no chlorine, to judge from the figures furnished. Indeed I may say that some of the most depressing hours of my life have been those spent in collecting and arranging the "poor" and "bad" analyses here given, especially those grouped together in Part II of the collection. They represent a vast amount of misdirected and wasted energy, and, in many cases, have served as foundations for much logical and otherwise excellent reasoning, which has been almost wholly vitiated by the worthlessness of its basal data. This would often be ludicrous were it not pathetic.

The publication and general acceptance of all this worthless analytical matter reveals the weakest side of petrography, and goes far toward showing why, up to the present, no classification of igneous rocks based on purely chemical or quantitatively mineral characters has been proposed, or would be likely to receive the general assent of petrographers.

The chief reason for this low standard of criticism on the part of petrographers as regards analysts and analyses would seem to be that, while all of them are necessarily conversant with chemistry from the theoretical side, few have much knowledge of the theory of quantitative analysis or much experience in its methods. The fact is not generally recognized that the complete and adequate analysis of an igneous rock is one of the most complex and, in some respects, one of the most difficult problems of analytical science, far beyond the capabilities of a novice, and demanding not only chemical knowledge and manipulative skill, but often the exercise of considerable judgment derived from experience in solving the perplexing problems which may present themselves.[a]

With the greatly increased importance of chemical analyses at the present time, it can justly be considered that the ability to make an accurate and fairly complete chemical analysis of an igneous rock should form an essential part of the training and equipment of every petrographer. It is only by such knowledge that one is able to judge at first hand of the true value of an analysis, to see where errors have possibly crept in. and to discriminate between what is good and worthy of use and what is bad and to be rejected.

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[a] Cf. Hillebrand, op. cit., p. 16.

In view of this state of affairs it will be pertinent to discuss at some length the qualifications which go to make a good analysis, the theoretical and practical criteria by which analyses may be judged. and. in a rough way, the estimation of the weight which may be allowed any given analysis in theoretical discussions. Indeed, one of the main objects of the present publication is to call the attention of petrographers in general to this state of affairs, so that they may realize more clearly the pressing need for reform and the necessity for a just appreciation of the value attaching to good analytical work and of the dangers incident to the use of poor analyses. There is undoubtedly at the present time a marked improvement in this respect, but so many recent instances of lack of judgment or criticism in the publication of analyses might be cited that the need is apparent, even now, for a free discussion of the subject.

I realize fully that this is a delicate task, and difficult, if not impossible, to do without causing ill feeling. This difficulty is, of course, inevitable in any discussion involving the frank statement of weaknesses or errors. I have therefore endeavored to make the discussion as impersonal as possible, though some references as illustrations have been unavoidable. Fortunately, having myself done considerable analytical work, I can only too often cite my own analyses as instances of what is to be avoided.

REPRESENTATIVENESS.

CHARACTER OF THE ROCK MASS.

An analysis of an igneous rock is of value in direct ratio as it fulfills two conditions: that the specimen analyzed is representative of the rock mass, and that the analysis itself is accurate and complete in its determination of the constituents present. We may consider these two factors in the order stated.

The representative character of the specimen depends partly on the character of the rock mass and partly on the amount of material taken.

If the mass be uniform, or if a single uniform facies be the object of investigation, two courses of procedure are possible. A single representative specimen from one locality may be selected for analysis, or pieces of several specimens collected from different parts of the mass may be taken, pulverized, and mixed, and the analysis made of this mixture.

Of these the latter labors under the disadvantage that a check by means of reexamination by others will be impossible, and, furthermore, the uncertainty will always exist that the mixture of several specimens really represents the composition of the whole better than does a single specimen.

In the great majority of cases it is by far the best plan to select a definite locality, preferably one which is of a permanent nature and not likely to be lost through building or other operations, the rock of which can be considered representative of the whole mass, and make the analysis of a specimen from this.

If there should be doubts as to the general uniformity of the whole mass, it is better to make several analyses from different parts, even though this involves considerably more analytical labor, since a much more detailed knowledge is thus gained, and important features which may otherwise be overlooked may be rendered evident.

In the case of a heterogeneous mass, such as a stock or dike with marginal facies, it is likewise always the wisest plan to have separate analyses made of the different facies, even though the determination of the character of the mass as a whole be the only object in view.

The decision as to the representative character of the specimen selected must be left to the collector, and it would seem natural that a petrographer who had the analysis of a rock in view, or who thought the results might be of value, would carefully consider this question in the field and select his material accordingly. The evidence is conclusive, however, that the specimen analyzed has often been collected with no reference to this point, this fact greatly diminishing the value of the analytical work afterwards expended on it.

In connection with this subject the question naturally arises whether rock masses are indeed so uniform in character that any single specimen will be truly representative of the whole, and whether specimens from different parts of an apparently uniform mass, even if close together, may not differ widely in composition. A full treatment of this fundamentally important topic is impossible here, but the outcome of such a discussion would be that, though the latter statement undoubtedly applies in the case of modally or normatively (but not texturally) eutaxitic or schlieric masses, yet a rock mass which is megascopically and microscopically uniform will furnish, by proper selection, specimens that, if examined by two or more competent analysts and by reliable methods, will yield results that are sensibly identical. In other words, in the terms of the new classification, they would fall in the same subrang, or very close to the same border line.

No investigation appears to have been made specially to decide this point, but a number of examples are furnished by the present collection which bear out the conclusion stated. Among them may be mentioned the analyses of the Butte grano-harzose-amiatose (granite) (Nos. 1, 2, and 3), the phyro-miaskose (phonolite) of the Black Hills (Nos. 8 and 9), the grano-essexose (essexite) of Salem Neck (Nos. 2 and 3), the phlegrose-nordmarkose (sölvsbergite) of Coney Island (phlegrose No. 4 and nordmarkose No. 3), and the liparose (keratophyre) of Marblehead Neck (Nos. 12 and 13).

The specimens should, of course, be taken from fresh, unaltered rock, since only thus do they represent the chemical character of the magma. In some cases, however, absolutely fresh material is not to be had; but if there be more than a very slight degree of alteration an elaborate analysis is not called for. All that we can hope to obtain from an analysis of such a rock is a general idea of its magmatic character, and while the determination of the main constituents should be made with accuracy, it will scarcely be worth while to determine the minor ones, unless for special purposes, such as the study of rock-weathering. If the alteration is slight the proportions of the main oxides will not be very much changed, but those of the minor ones will be relatively much more so.

AMOUNT OF MATERIAL.

The determination of the amount of material that will adequately represent the mass is a matter of great importance and deserves the careful consideration of the petrographer and the analyst. For actual analysis at least 10 grams of pulverized rock should be available, but, in view of the possibility of the redetermination of some or all of the constituents or the determination of some for which large portions are needed, it is well to have 20 or 30 grams.[a] No definite rule can be laid down as to the amount that should be taken, which depends on the granularity of the rock and whether it be porphyritic or not. In the case of fine- or medium-grained aphanitic or glassy rocks, which are not porphyritic or are only finely so, a few chips, amounting to 30 or 40 grams, will be quite sufficient. Of coarse-grained rocks, or those which are coarsely porphyritic, much more will be needed, the amount being dependent on the coarseness of grain. For nearly all ordinarily coarse-grained rocks, or those in which the phenocrysts are less than an inch in diameter, an ordinary small hand specimen, or even a smaller fragment, will be quite sufficient, the size being determined by the judgment of the petrographer. When the rock is abnormally coarse, as in some pegmatites, nephelite-syenites, etc., much more must be taken, often several pounds. In some rare cases a large rock surface must be measured to determine the relative amounts of the various minerals, and proportionate amounts of these must be taken and mixed for analysis. This last possibility, fortunately, is of rare occurrence, and an analysis made of such material must be regarded as only approximate at best.

When more than 30 grams or so of material is used it is not necessary to pulverize the whole, for a sample may be obtained by making successive crushings and quartering, as in assay work. Care must be taken to do this properly and systematically, according to methods given in any treatise on assaying, and reference may be made here to a paper by Mr. S. A. Reed, which discusses the theory of the matter.[b]

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[a] Cf. Hillebrand, Bull. U. S. Geol. Survey No. 148, 1897, p. 23.

[b] Reed, S. A., School of Mines Quart., Vol. VI, 1885, p. 351.

It should be noted that the whole of the small amount of chips or sample obtained by quartering must be pulverized and used for analysis. The rock-making minerals differ so greatly in brittleness that if only a portion of the sample be pulverized this will not represent the true average composition, for the more brittle minerals, as quartz and the feldspars, will be first reduced to powder, while the tougher ones, as hornblende, pyroxene, and biotite, will take more crushing and grinding. If, therefore, the last portions, which do not pass easily through the silk sieve, are rejected, the analysis will show a slightly more salic composition than exists in fact.

On the other hand, owing to the same fact, the fine dust lost during the operations of crushing, sifting, and grinding will be composed chiefly of salic minerals, so that, strictly speaking, all rock analyses are slightly more femic than they should properly be, though the error must be of very slight importance.[a] At any rate, it seems to be unavoidable.

MICROSCOPICAL EXAMINATION.

A microscopical examination of the rock in thin section should always precede the chemical analysis. This not only reveals clearly the character of the rock as regards general composition and freshness, but often furnishes invaluable indications as to what minor constituents, such as ZrO_2, P_2O_5, SO_3, Cl, etc., are present.

The petrographer can thus indicate to the analyst which of the minor constituents are to be estimated and those for which it is not worth while to look. Some of the main analytical processes may also be modified and shortened by a knowledge of the general character of the rock, and in both these ways a great amount of useless labor will often be saved to the careful and thorough but nonpetrographical analyst, who, in the absence of such indications, may spend much time looking for constituents which are absent, in the conscientious endeavor to have his analysis complete.

ACCURACY.

Assuming that the sample analyzed is representative of the rock mass, the degree of correspondence between the figures yielded by the analysis and the true composition of the rock is dependent on two factors—its accuracy and its degree of completeness.

By accuracy is meant the degree of precision with which the constituents sought for have been determined, quite apart from the fact whether or not all those present have been determined or separated one from another. The accuracy of an analysis, which may be discussed apart from its completeness, depends on the personal ability of the analyst to make the analysis and on the reliability and adequacy of the methods employed.

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[a] The only instance known to me where this has been especially investigated is that in S. Zaleski's study of the amount of quartz in granites (Tschermak's Mineral. Mittheil., Vol. XIV, 1895, p. 350). He shows by determinations of silica that the dust produced in the pulverization of granites is notably richer in feldspar relatively to quartz and dark minerals than the coarser portion of the powder.

The factor of the analyst has already been touched on in speaking of the practice of entrusting rock analyses to students, and the obvious truth that the personal factor is a most important one in the making of analyses need only be stated here. Thus the work of a trained and experienced man will be, presumably, of far higher character than that of a beginner publishing his first analyses in an inaugural dissertation, or that of a student in chemistry to whom the analysis of a rock has been given for practice. It is true that the man of experience may not be a good analyst, or may be hampered by poor methods or reagents, and conversely the work of the beginner may be, and often is, of very good quality; but the fact remains that the latter will not carry the weight of the former, in the absence of confirmation of its character by other evidence.

The employment of the most reliable and accurate methods is, of course, essential to good analytical work. As, however, this is not intended to be a treatise on the analysis of rocks, the matter can be only briefly touched on, for the especial purpose of pointing out to the nonanalytical petrographer some of the more common pitfalls and sources of error that beset the path of him who undertakes the analysis of rocks.

In view of the wide experience of the chemists of the United States Geological Survey, and the unequalled, uniformly high standard of excellence shown by their work, it may be recommended that the methods adopted by them[a] should be employed whenever possible, at least until improvements on them, or better methods, shall have been devised. Too high commendation can scarcely be bestowed on their analyses, especially the later ones, which stand in a class apart from almost all others, as a study of the material here collected will render evident.

POSSIBLE ERRORS.

The fact must not be lost sight of by petrographers unacquainted with quantitative analysis, that in certain portions of the processes, especially in the older methods, there is liability to serious error, due either to inherent defects or to the necessity for special care in manipulation, such care as is possible only with a careful and experienced analyst. The most prominent of these sources of error will be briefly stated.

Liability to error attends the determination, not only of the minor constituents, where it is generally of comparatively small moment, but unfortunately that of most of the main and most abundant chemical rock constituents, in which case it becomes a matter of the utmost importance. The more important determinations which we may discuss are those of SiO_2, Al_2O_3, Fe_2O_3, FeO, MgO, CaO, the alkalies, TiO_2, P_2O_5, and MnO.

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[a] Cf. Bulls. U. S. Geol. Survey Nos. 148 and 176.

In regard to silica, Hillebrand[a] has clearly shown that the methods usually employed do not yield accurate results, but that two or more evaporations alternating with filtrations, together with prolonged ignition over the blast, are necessary. He points out the fact that this "may serve to explain in small part the excessive summations often encountered in rock analyses." It is also shown that silica is not wholly thrown down by ammonia or sodium acetate along with the aluminum and iron, and that it is appreciably soluble in melted potassium pyrosulphate.

Increase in the apparent amount of alumina, due to imperfect separation of magnesia, is probably the error of considerable magnitude most commonly met with in rock analyses, especially in those of femic (basic) rocks. It arises from the fact that magnesium hydroxide tends to fall down with aluminum hydroxide on precipitation with ammonia. This can be prevented only by the presence of sufficient ammonium salts and by repeated precipitations, either with ammonia alone or with sodium acetate as well.

These conditions are easily neglected by the inexperienced analyst, and, in compiling the present collection, I have noted so many instances where this error has certainly been made, and so many others where it is strongly suspected but not definitely provable, owing to the insufficiency of the petrographic description, that I must add my word of warning to those of Hillebrand[b] and Pirsson.[c]

In regard to the determination of ferrous iron, Stokes[d] has shown that ferric sulphate exerts a marked oxidizing effect on pyrite, and starting from this fact Hillebrand[e] demonstrates the unreliability of the Mitscherlich method, commonly employed in Europe for the determination of ferrous iron, i. e., decomposition with sulphuric acid in a sealed tube. This gives often, especially in rocks rich in iron, too high results for FeO, and decomposition by hydrofluoric acid in an atmosphere of carbonic acid is to be preferred.

It must be noted, however, that in the hands of inexperienced analysts the latter method, as well as the former, is liable to give low results for ferrous and correspondingly high figures for ferric iron, in consequence of the partial oxidation of the former, due to careless manipulation. This error is the undoubted explanation of a number of anomalously high figures for ferric iron to be found in the collection, for these do not accord with what can be discovered about the mineralogical composition as revealed by the descriptions.

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[a] Bull. U. S. Geol. Survey No. 176, 1900, p. 52, and Jour. Am. Chem. Soc., Vol. XXIV, 1902, pp. 362 et seq.

[b] Hillebrand, Bull. U. S. Geol. Survey No. 176, 1900, p. 55.

[c] Pirsson, Jour. Geol., Vol. IV, 1896, p. 688.

[d] Stokes, H. N., Bull. U. S. Geol. Survey No. 186, 1901.

[e] Bull. U. S. Geol. Survey No. 176, 1900, p. 89.

Another possible error in the determination of the iron oxides, and one which may be easily made by the novice, is that involved in the reduction of the solution of the precipitate by ammonia water for the determination of total iron. If the current of H_2S is not continued for a sufficient length of time, the ferric sulphate will not be completely reduced to the ferrous state, so that the apparent amount of ferric oxide will be too low and that of alumina correspondingly too high. This will not, of course, affect the ferrous iron, as this is always determined in a separate portion.

The error involved in the liability of magnesia to be precipitated in part with the alumina, which has already been touched on, will lead to too low figures for this constituent.

Another error in the determination of this oxide, though in general of less magnitude and importance, is that involved in its precipitation as ammonium magnesium phosphate. Gooch and Austin[a] have shown that under the conditions usually obtaining in this determination there is a strong tendency toward high errors on the side of apparent increased amount of magnesia, owing to the presence of excess of the precipitant, ammonium salts and free ammonia. Since this error is due to the fact that, under these conditions, the ammonium magnesium phosphate contains more P_2O_5 than is called for by the ideal constitution, it will not affect other constituents, but will be positive in its effect, and thus raise the summation of the whole analysis. It is possible that this may account in part for some of the curious, slightly high summations met with in what are apparently otherwise excellent analyses.

A source of error in the determination of CaO, of possibly frequent occurrence, is that involved in the use of ammonia water that is not fresh. The solution is then likely to contain a notable proportion of ammonium carbonate, which will cause the precipitation of part of the CaO as carbonate along with the alumina, etc. This will be weighed with these, which will increase the apparent amount of Al_2O_3, and decrease that of CaO by the same amount.

In regard to the determination of the alkalies, I need only add a word in confirmation of the view expressed by Hillebrand[b] as to the advantages of the Lawrence Smith method, both as to accuracy and as to time saved. The slight correction necessary for the minute amount of alkalies present in the calcium carbonate used is a constant one, easily and safely applied, while, on the other hand, any of the other methods of decomposition involving the preliminary separation of alumina, iron oxides, lime, and magnesia introduces a large element of uncertainty and possible error, owing to the impurities contained in the reagents and taken up from the glass vessels.

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[a] Gooch, F. A., and Austin, M., Am. Jour. Sci., Vol. VII, 1899, p. 197.

[b] Bull. U. S. Geol. Survey No. 176, p. 96.

The colorimetric method for the determination of TiO_2, described by Hillebrand, is by far the most accurate and the quickest, and should be uniformly used, since the older methods, based on its precipitation by prolonged boiling, are very uncertain unless the conditions are very exactly adjusted, especially when much TiO_2 is present, in which case it is very liable to be contaminated by Al_2O_3 and Fe_2O_3. The assumption which is sometimes made, that the residue left on evaporation of the silica with hydrofluoric acid represents all the TiO_2 present, is quite unwarranted, since this residue contains only part of the TiO_2 at most, and also some Al_2O_3, Fe_2O_3, P_2O_5, etc.

In cases where the separation of alumina, etc., has been made by the sodium-acetate method, for the more complete separation of MnO, it must be remembered that, unless the amount of acetic acid present and the general conditions are very exactly controlled, there is great danger of incomplete precipitation of alumina at this stage. The Al_2O_3 not precipitated here will subsequently be thrown down with the MnO and weighed with it, rendering the figures for this oxide too high and those for alumina correspondingly low. This error is one of comparatively frequent occurrence, judging from the abnormally high amounts of MnO often stated as present, and is one especially liable to be made by the inexperienced analyst. For this reason it would be preferable, unless the analyst has had experience in the sodium-acetate method, to precipitate the alumina, etc., with ammonia several times rather than use the sodium acetate-method, even though the precipitation of MnO be less complete, since the error involved in the determination of MnO is of far less importance than that possibly affecting the Al_2O_3.

COMPLETENESS.

The ideal analysis should show the percentage amount of every constituent present, and, for practical purposes at any rate, all those that are present in amount sufficient to make their determination a matter of interest, or whose presence or absence bears on the problem for which the analysis is made.

The amount which may make a constituent worth determining will vary, of course, in different cases, as will the number of constituents to be sought for. Thus in such simple rocks as most liparases (granites, rhyolites, etc.) and labradorases (anorthosite) it is not necessary to determine such a number of constituents as should be determined in the case of miaskares and rocks belonging to the dosalane and salfemane classes. But in view of the facts that an analysis should be truly representative of the composition of the rock, that it may, if complete, be of use to others for the discussion of problems other than the one immediately in hand, and the general proposition that only good work should be countenanced in science, every analysis should be as complete as it is practicable to make it.

MAIN CONSTITUENTS.

It goes without saying that in every rock analysis worthy of the name all the usual main constituents must be determined. These will include silica, alumina, ferric and ferrous oxides, magnesia, lime, soda, potash, and water.

Unfortunately a large number of analyses exist in which the iron oxides have not been separately determined, but are given together, as either Fe_2O_3 or FeO, or most equivocally bracketed opposite both of these. Unless the iron oxides are present in very small amount, e. g., less than 1 per cent, or unless the presence of a considerable amount of pyrite or pyrrhotite makes the determination of FeO very uncertain, this is a quite unpardonable proceeding, since the proper separate determination of these two is essential to the complete chemical discussion of the rock magma and the calculation of the mineral composition, either normative or modal. This, with the error involved in the separation of alumina and magnesia, is the most common defect in rock analyses, and a surprisingly large number have been rejected from Part I of the tables on this account.

The alkalies are occasionally estimated together (as Na_2O), or determined by the difference from 100 per cent. This procedure is found especially in analyses of the more femic rocks, but sometimes in those of rocks in which the alkalies amount to several per cent. This is also a form of slovenliness for which there should be no excuse, except in rocks composed largely or entirely of such minerals as olivine, magnetite, and ilmenite, when the alkalies can be present only in traces at most.

The molecular weight of orthoclase and albite is so high[a] that in any chemico-mineralogical system of classification, or in the calculation of the mode, the determination of both of these oxides is of the greatest importance. Furthermore the assumption is made that the sum of the analysis will be exactly 100 per cent, which is quite unwarranted in view of the great rarity of this occurrence, and especially when the chemist thinks so little of his work as to be unwilling to determine the alkalies properly.

In some highly salic or highly alkalic rocks MgO and CaO are not determined, but are given as "traces." While in most of these cases their nondetermination will not seriously affect the results of calculation, yet such a procedure is to be deplored as being not first-class work. The term "trace" should indicate strictly and uniformly that the constituent has been looked for and found, but in unweighable amount (0.1 milligram or less), while if it is not looked for because it is supposed to be present in small amount, some such phrase as "present, not determined" (p., n. d.) should be employed. The limits assigned to the term "trace" vary widely, and in the collection may be found instances where this term is used of constituents that are certainly present to the extent of half of 1 per cent or much more.

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[a] One per cent of K_2O corresponds to 5 per cent of orthoclase, and the same amount of Na_2O to 8 per cent of albite.

MINOR CONSTITUENTS.

Assuming that the eight main constituents are to be determined, we may take up the discussion of those usually regarded as "minor." Both Clarke[a] and Hillebrand[b] lay stress on the importance of their determination from the point of view of the solution of broad petrological problems. Thus the work of the chemists of the United States Geological Survey has demonstrated the comparative abundance and general distribution of titanium, barium, and strontium, and, in the case of barium, a greater abundance along the Rocky Mountain region than in the eastern and the extreme western parts of the United States. The frequent presence of vanadium in the more femic (basic) rocks and of molybdenum in the more quaric (siliceous) ones,[c] of zirconium in presodic and especially nephelite-bearing rocks, and of nickel and chromium in very femic rocks, are other well-known instances of important contributions to our knowledge of rock magmas due to completeness in the making of analyses.

Indeed, Hillebrand has entered such a strong plea for completeness in rock analysis that little more need be said to convince petrographers of the correctness of his position. Since, however, there is a strong tendency to regard as adequate for petrographical purposes analyses in which only the eight main constituents have been determined, further remarks, especially in elucidation of some special points, will not be amiss.

It is obvious that when the rock carries notable amounts of minerals which contain as essential ingredients any of the "minor" constituents, these should always be determined. Thus, Cl and SO_3 should always be included in the analysis of rocks with sodalite or noselite; TiO_2, when titanite, ilmenite, or titaniferous augite are present; P_2O_5, when there is any apatite, and ZrO_2 if there is considerable zircon or eudialyte. If these constituents are not determined the analysis will not show adequately the composition of the rock, or, as Clarke puts it, "the petrographer has been more thorough than the chemist."

It is for this reason that a microscopical study of the rock section should always precede the analysis. The conscientious chemist who is not a petrographer, and who, therefore, does not know what minor constituents are especially to be looked for, can only make sure of the completeness of his work by the determination of everything possible. While the results will always be of value, yet in many cases part of this labor may be quite unnecessary, involving a waste of valuable time which might be obviated if the petrographer would furnish with the material an indication of what minor substances are especially to be looked for.

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[a] Clarke, F. W., Bull. U. S. Geol. Survey No. 148, p. 11.

[b] Hillebrand, Jour. Am. Chem. Soc., Vol. XVI, 1894, p. 90; Bull. U. S. Geol. Survey No. 148, p. 17.

[c] Hillebrand, Am. Jour. Sci., Vol. VI, 1898, p. 216.

Although the determination of all constituents, even those which are present in mere traces, is to be desired, yet in practice a compromise must be made, generally, between the degree of completeness and the time to be devoted to practical analytical work. The determination of most of the minor constituents takes considerable time, and, if the number of analyses to be made is great, or the time available is limited, it may not be advisable to determine all the lesser constituents, but only those essential to a proper understanding of the rock. This is especially true of the rarer substances, as ZrO_2, Cr_2O_3, V_2O_3, F, NiO, CoO, CuO, SrO, etc., and SO_3 and Cl in rocks without the sodalite group of minerals. On the other hand, such constituents as TiO_2, P_2O_5, BaO, and S, which are now known to be commonly present and widely distributed, should be determined in every analysis which makes an attempt at completeness, as every modern analysis should. It is also generally of importance to determine Cr_2O_3 and NiO in the most femic rocks, especially when olivine is abundant, as they are apt to be present in very considerable amount.

In discussing this matter, an important point to bear in mind is that the determination of certain of the minor constituents affects the figures for other and often very important ones. This arises from the methods of analysis necessarily employed, in which several constituents are precipitated together in one operation, and subsequently some of them separately determined, the figures for one being known by the difference. Of these by far the most important are TiO_2 and P_2O_5. These are not only almost always present, often in very considerable amount, but their determination affects that of the highly important alumina. In the course of the analysis Al_2O_3, Fe_2O_3, TiO_2, and P_2O_5 are precipitated together, the three last are determined separately, and the alumina is estimated by difference from the sum of the four, since so far no satisfactory method has been devised for its independent determination.

It is obvious, therefore, that, if TiO_2 and P_2O_5 are not determined, the figure for alumina will be too high. In the case of all but the most salic rocks the error may be of great moment, since these two oxides may be present in a very considerable amount, and the alumina is the only measure we have for the calculation of the amount of anorthite—modal or normative—from the analysis.

Similarly, the nondetermination of ZrO_2, Cr_2O_3, and V_2O_3 will raise the figures for alumina, since these are also precipitated together. In the great majority of rocks, however, the error will be negligible, owing to the minute quantities of these oxides usually present.

Vanadium also affects the determination of ferrous iron, and, if presumably present in more than traces, it may be determined and a proper correction applied to the ferrous iron[a] in the most accurate work. Fortunately this will very seldom be necessary.

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[a] Hillebrand, Bull. U. S. Geol. Survey No. 176, p. 95.

As SrO is precipitated with CaO as oxalate, its nondetermination will render the apparent amount of CaO too high. As this substance rarely occurs in more than traces, this error is negligible for all but the most accurate investigations.

Lithium chloride remains with the sodium chloride after separation of the potassium as platinichloride, but, so far, has rarely been found to be present in quantity great enough to warrant its estimation.

The question as to whether MnO should be determined or not is a rather perplexing one. Of course for the best work, and if the analyst is sufficiently experienced not to fall into the error possible in its determination by the sodium-acetate method already spoken of, it should be done. But, on the other hand, its determination adds very materially to the time needed for the analysis, and involves as well the use of a method liable to an error which will affect seriously a much more important constitutent. Furthermore the long list of analyses made by the chemists of the United States Geological Survey, as well as those made elsewhere, show that, while almost always present, its amount is very small, in general little more than a trace. Thus in all the analyses of igneous rocks published in Bulletin 168 of the United States Geological Survey it only exceeds 0.50 per cent twice,[a] and falls between 0.40 and 0.50 five times.[b] Indeed, it is of interest to note in this connection that Professor Clarke's estimate of the average composition of the igneous rocks of the United States[c] shows that the amount of manganese in them is only about one-sixth of that of titanium, and is even less than that of phosphorus. In view of the great variety of igneous rocks represented by these analyses and of the very high character of the analytical work, the high figures so often found for this oxide in many other analyses are to be regarded with suspicion, the probability being that in them the error already spoken of has been made.

That the nondetermination of MnO will affect the figures for other constituents is certain, but to what extent is not very clear. If the separation of Al_2O_3, etc., has been made with ammonia water, a small portion will be thrown down and be weighed as alumina. Part of that which passes through in the filtrate will be thrown down with calcium oxalate and weighed as CaO. But, as manganese oxalate is slightly soluble in water, some of the manganese will be thrown down as phosphate with the magnesia and weighed with this. Little is known of the various proportions of the manganese which will thus be distributed, and the matter is one which calls for investigation. It has seemingly been passed over in the text-books on quantitative analysis, owing to the assumption that the MnO is separated in the regular course before the precipitation of CaO and MgO.

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[a] 0.93 in A, p. 81; 0.70 in F, p. 212.

[b] 0.45 in C, p. 169; 0.43 in D, p. 161; 0.41 in E, p. 214; 0.40 in E, p. 20, and A, p. 147.

[c] Clarke, Bull. U. S. Geol. Survey No. 168, p. 15.

At any rate, in view of the small amount of this substance present, its probable distribution among several constituents, thereby affecting each of them only to a negligible extent, and the loss of time and possibility of error affecting Al_2O_3 involved in its determination, it may be held that the determination of MnO is not essential or called for, even in what is otherwise very complete and accurate work.

In regard to the determination of H_2O, I am in accord with Dittrich[a] and Hillebrand,[b] that the rock powder for analysis should be air dry, and that it is advisable (though not necessary) to discriminate between combined and hygroscopic water, i. e., that driven off above and below 110°. The remarks of Hillebrand on the inadvisability of the method for the determination of H_2O by "loss on ignition" will be concurred in by every experienced analyst who has considered the matter.

Except where minerals containing water or hydroxyl, as analcite or muscovite, are present as primary components, the determination of H_2O is not a matter vital to proper comprehension of the rock magma, but its amount, as well as that of CO_2, is of very great importance as a measure of the freshness of the rock. The determination of water, therefore, must be regarded as essential to every rock analysis, and that of CO_2 also when the presence of calcite or cancrinite or the altered condition of the rock demands it.

In this connection a common practice may be briefly alluded to, namely, that of deducting H_2O and CO_2 when the rock is not fresh, calculating the remainder to 100 per cent, and assuming that the rèsult represents the composition of the original, unaltered rock. This assumption is quite unwarranted and is apt to lead to totally erroneous conclusions, since the processes of weathering or alteration do not usually consist in the simple addition of H_2O and CO_2, but in the assumption of these concomitantly with changes, either additive or subtractive, in some or all of the other components. And as yet we are unable to determine these with any degree of success.

Furthermore, such a procedure, like that of any recalculation to 100 per cent, unless the original figures are given, deprives others of one of the best methods of judging of the value of the analysis, by concealing the original summation.

RATING OF ANALYSES.

We have hitherto considered rock analyses from the point of view of the analyst. It remains to discuss them from that of the petrographer who wishes to use the results, and who therefore needs to have some means of judging as to their reliability. For this purpose it is necessary to discuss the features of an analysis on which this judgment may be based, and it will also be convenient to formulate a method by which the general character of an analysis may be expressed concisely. This expression of the relative worth of an analysis may conveniently be called its "rating,' in analogy with that of commercial houses.

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[a] Dittrich, M., Mittheil. Badischen Geol. Landesanst., Vol. III, p. 79, 1894.

[b] Hillebrand, Bull. U. S. Geol. Survey No. 148, 1897, pp. 26 et seq.

The user of the analysis must rely on the judgment of the collector and the analyst that the specimen, both as to locality and size, correctly represents the rock mass, unless some reason appears to the contrary. It rarely happens that the analysis in itself gives any indication as to this point, at least in a decisive way.

The special case of the analysis of the groundmass of a rock is, however, not uncommon, and may be briefly discussed. For the general purposes of petrography such analyses are of little use, and they have been excluded from the present collection. On the other hand, for the solution of certain special problems they may be of great value. It must be pointed out, however, that an essential adjunct to their use is a knowledge of the relative amounts of the phenocrysts and the groundmass, unless only a knowledge of the composition of, for example, glassy or microaphanitic groundmasses be desired. If the purpose is the study of the order of crystallization, or some such thing, a knowledge of the quantitative relations is indispensable.

Unfortunately, this knowledge is wanting in every case, so far as my knowledge extends, quantitative relations being given only in the cases of analyses of the portions soluble and insoluble in acid. This is only another phase of the prevailingly qualitative way of regarding petrographical problems.

It can scarcely be reiterated too often that the science of petrography must become quantitative if it is to make real and certain advance. The time has passed when a simple statement of the minerals composing a given rock, with a description of their physical properties, will suffice. We need to know in addition the relative amounts of the minerals as accurately as may be, with their chemical composition, as well as that of the rock itself, derived either from chemical analysis or from determination of the quantitative mineral composition. Otherwise many of the broadest and most fundamental problems in petrology will be incapable of solution, and the science will still consist of vague gropings after the truth, because some of the most essential facts—the quantitative relations—remain neglected and unknown.

ACCURACY.

Assuming, therefore, that the analysis is representative as far as the material goes, we have its accuracy and its completeness as means of judging its value. The features on which this must rest, as far as accuracy is concerned, may be stated as follows:

- Internal evidence
  - (*a*) Agreement with the mode.
  - (*b*) Summation.
- External evidence
  - (*c*) Analyst.
  - (*d*) Methods of analysis.
  - (*e*) Indirect evidence.

INTERNAL EVIDENCE.

Agreement with the mode.—It may seem superfluous to state that the chemical analysis of a rock must accord with its quantitative mineral composition as determined by the microscope. That such a statement is necessary, however, study of the present collection, with the many discordant results it contains, will render clear.

When the mode of a rock is known, this is the best basis for ascertaining whether the analyst has done his work well or not. Given the quantitative amounts of the minerals present and a knowledge of their composition, the chemical analysis can be easily checked by the calculation of the chemical composition from the mineralogical data.[a] The agreement need not be exact, and indeed seldom is except under the most favorable conditions, since the measurement of the amounts of the constituent minerals under the microscope can not be of the highest order of accuracy, and assumptions must often be made as to the chemical composition of some of them. But the result will usually be sufficiently accurate to show whether notable analytical errors have been made or not.

In the great majority of cases, however, only the roughest kind of quantitative data are either given in the descriptions or conveyed by the present rock names, if indeed one is fortunate enough to have any kind of quantitative information as to the mineral composition vouchsafed him. Here one can detect only errors of a flagrant kind, and of magnitudes involving several per cent of certain constituents.

In considering the possibility of any of the errors previously mentioned, the judgment of the petrographer, based on a knowledge of the chemical composition of minerals as well as on his knowledge of analytical work, must come largely into play. All the chemical features must be taken into consideration in connection with the description, especially in the absence of exact quantitative mineralogical data.

Thus high alumina (e. g., 20 per cent or more) in a rock with less than 50 per cent of silica, and even with low magnesia, is not necessarily due to an error in the separation of alumina and magnesia. It may be caused by the nondetermination of TiO_2 and P_2O_5, or by the presence in abundance of anorthite or nephelite, which will be indicated by correspondingly high lime or soda. Apparently high soda and low potash in a so-called orthoclase rock may arise from an imperfect description or identification of the feldspar, which may be in reality a soda-orthoclase.

It must also be borne in mind that cases occur where the microscopical is seemingly at variance with the chemical analysis, and yet the latter is undeniably correct. This is especially true of very fine-grained holocrystalline or hypocrystalline rocks, and it will happen not infrequently that further, more critical, microscopical study will reveal a constituent which has been overlooked, but whose presence is manifest after the analysis has indicated its existence.

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[a] Cf. Jour. Geol., Vol. X, 1902, pp. 667 et seq.

An instance of this is the hornblende-phyro-essexose (kulaite) of Phrygia, investigated by the writer, in which the rather abundant nephelite was at first overlooked in the partly glassy groundmass, and was discovered only when repeated careful chemical work and calculation of the mode showed that it was necessarily present.[a]

Another well-known instance where the chemical analysis does not correspond with the microscopical character is that of the wyomingose and orendose of the Leucite Hills.[b] In the former, although modally the only salic minerals visible are leucite and noselite, the analysis shows a large excess of silica. In the orendose there is an excess of alkalies over alumina, with excess of silica in one case. So far, these discrepancies have not been explained, though there can be no doubt of the high degree of accuracy and completeness of the analysis.

But such occurrences are exceptional, and if no explanation is afforded by the description to account for the peculiarities of the analysis we may, in general, assume that errors have been made, and consider the analysis untrustworthy in this respect.

In this connection it will be well to mention that the simple method of calculating the norm of a rock, recently described,[c] is of very great use in checking an analysis. While apparently complicated, in the majority of cases it is readily and quickly effected. Then, with some knowledge of the relations of the standard and the alferric minerals, sufficiently close adjustments of the mineral molecules are easily made to permit a comparison of the mode with the analysis.

It must not be forgotten, even here, that in the absence of a knowledge of the quantitative relations of the component minerals, very serious analytical errors may not be revealed by calculation of the mode, in this or any other way, from the chemical data. The error in one or more constituents may amount to several per cent, and yet a mode can be calculated which will apparently agree with the description or with a qualitative microscopical examination.

This is illustrated by the writer's first analysis of the ciminite of Fontana Fiescoli, near Viterbo.[d] The mode, as calculated from this analysis,[e] seemingly agreed with the microscopical examination, although subsequent investigation and analysis showed that the alumina and the magnesia were respectively too low and too high by about 3 per cent.[f]

Although it is always an unwelcome task to point out mistakes, yet the citation of some examples illustrating the more common errors may be useful. It must be premised, however, that there is no desire to call attention to the mistakes of individuals, but the possibilities of serious error, even among the best workers, will be pointed out. It is unfortunate that a few must be selected for this criticism, for, as a matter of fact, all are or have been thus culpable, so that no one petrographer can be held guiltless of errors in the use or making of analyses, or of lack of proper critical acumen in their selection in some cases; and from the application of these criticisms the critic is far from excluding himself. I trust, therefore, that those who are mentioned may pardon me for the disagreeable necessity to which I am put.

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[a] Washington, H. S., Jour. Geol., Vol. VIII, 1900, p. 611.

[b] Cross, Whitman, Am. Jour. Sci., Vol. IV, 1897, p. 132.

[c] Cross, Iddings, Pirsson, Washington, Jour. Geol., Vol. X, 1902, p. 644.

[d] Washington, H. S., Jour. Geol., Vol. IV, 1896, p. 837.

[e] Idem, Jour. Geol., Vol. V, 1897, p. 354.

[f] Washington, H. S., Am. Jour. Sci., Vol. IX, 1900, p. 45.

As an instance of the error in the separation of alumina and magnesia, besides that given above, there may be cited an analysis of the essexite of Rongstock,[a] which shows 46.93 per cent of silica, 24.19 alumina, and 2.42 magnesia. Part of the high alumina is to be ascribed to titanic and phosphoric acids, which were not determined; but, even making due allowance for these, some of the magnesia has undoubtedly been weighed with the alumina. This is clear on comparison with two other analyses of the same rock mass published by Hibsch,[b] which, with 50.50 silica, show about 17.85 alumina and 3.35 magnesia. The error will be even greater than is indicated by the difference between these figures, for the silica and other percentages of the analysis published by Lang make it certain that his specimen was more femic than those of Hibsch.

As another instance of this very common error there may be cited the first analysis of the monchiquite of Shelburne Point,[c] which gave 18.06 Al_2O_3 and only 1.12 MgO, although hornblende and olivine are abundant. Attention having been called to the manifest discrepancy,[d] it was reanalyzed by another chemist, with a result showing 15.87 Al_2O_3 and 8.32 MgO. Although this second analysis is far from being above reproach, yet it is sufficient to show that the greater part of the magnesia had been in the first analysis precipitated with the alumina. It is also almost certain that in the first the two chief errors had been made in the determination of iron oxides—that due to the partial oxidation of the ferrous iron in the course of its determination and that involved in the reduction of the solution containing total iron by insufficient treatment with H_2S. The figures for the alkalies are also quite impossible, and indeed the only ones which have any semblance of probable correctness in this unfortunate instance are those for silica and lime.

An illustration of the incorrect determination of the iron oxides, taking specimens of the rock as a basis of judgment, is furnished by the often-cited analysis of the syenite of Biella,[e] in which the ferric oxide is given as 6.77 and the ferrous as 2.02. Here there is a large excess of ferric oxide over that needed for the maximum possible amount of magnetite or for the augitic molecule $Fe_2O_3.(Mg,Fe)O.SiO_2$, with no hematite in the rock to account for it. We are therefore forced to conclude that a partial oxidation took place in the determination of FeO, resulting in the erroneous figures reported.

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[a] Lang, H. O., Tschermak's Mineral. Mittheil., Vol. XV, 1896, p. 191.

[b] Hibsch, J. E., Tschermak's Mineral. Mittheil., Vol. XV, 1896, p. 487.

[c] Kemp and Marsters, Bull. U. S. Geol. Survey No. 107, 1893, p. 34.

[d] Kemp, in Weed and Pirsson, Bull. U. S. Geol. Survey No. 139, 1896, p. 116.

[e] Cossa, Mem. Acc. Sci. Torino, Vol. XVIII, 1875, p. 28.

A very striking example of the error due to incomplete precipitation of alumina by the sodium-acetate method in separating MnO is that of the quartz-syenite of Fourche Mountain, in Arkansas.[a] One analysis of this rock gives 13.45 alumina and 5.29 manganous oxide, while the other yields the figures, respectively, 18.15 and 1.00, the sum of the first pair being 18.74 and that of the second 19.15. Here it is very obvious that in the first analysis over 4 per cent of Al_2O_3 has been weighed as "MnO," while it is almost as certain that the 1 per cent of the second is too high from the same cause, since the rock is very largely felic (feldspathic), and no manganese-bearing minerals are mentioned as being present.

Illustrations of error in the determination of the alkalies are furnished by a large series of analyses of Italian leucite-bearing rocks. Of these one may be cited of a leucite-melaphyre (leucite-basanite) of Monte Jugo, near Montefiascone,[b] which, with 48.30 silica and 15.07 alumina, shows only 0.94 soda and 1.73 potash. Of this holocrystalline rock Klein says, "Leucit und Augit walten in Gesteinsgewebe vor," and the section of a specimen collected by myself at the small hill bears this out, as it indicates that leucite constitutes about 40 per cent of the rock. The amount of potash in the analysis yields but 7.8 per cent of leucite, and is certainly far too low. This analysis and others of basanites of this region are so low in alkalies (especially potash) that, if they were correct, the rocks would necessarily carry up to 10 per cent of quartz, even on the assumption that all the bases took their highest-possible quota of silica, yielding orthoclase instead of leucite and hypersthene instead of olivine.

Many more examples of incorrect determinations could be cited, both of these and of nearly all other constituents, but the above must suffice to point out the importance of close scrutiny of the analytical figures in conjunction with the mineralogical data. It may be mentioned that in none of the cases cited, and indeed in scarcely any case involving serious error to be found in the tables, has any misgiving been expressed at the time the analysis was published as to the possibility of error, or any comparison of the analysis with the mode, no matter how glaring and self-evident the incorrectness.

Summation.—The summation of a rock analysis is often an important index to its character, and should always be taken into consideration in rating it. In regard to the summation consistent with good work, Hillebrand puts the matter very clearly[a] in his remarks to the effect that a summation somewhat over 100 per cent is better than one below 100, and he also assigns the limits for good work as 99.75 and 100.50. With his reasoning and his limits I fully concur, though in practice one may be a little lenient and extend the limits allowable to 99.50 and 100.75 with advantage.

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[a] Williams, J. F., Ann. Rept. Geol. Survey Arkansas, 1890, Vol. II, 1891, p. 99.

[b] Klein, C., Neues Jahrbuch für Min., Vol. VI, 1889, p. 20.

While figures below or in excess of these limits are very good evidence of error somewhere in the analysis, the converse is not always true, that figures within these are proof of correct results. Several errors may, of course, balance one another, so that a summation very close to 100 will be yielded, although the analysis may be utterly worthless. At the same time, unless indications appear that the analysis is not a good one, it must be taken at its face value. A good summation must be held as evidence of good analytical work as far as it goes. On the other hand, as has just been said, very low or very high results are proof positive that that analysis is incorrect in some particulars, or possibly as a whole.

A low summation may be due to the nondetermination of some constituent, to poor methods, to carelessness in manipulation, or to all combined. In connection with the first of these it may be remembered that the determination of water by "loss on ignition" tends to yield a low total, owing to the oxidation of the ferrous iron during the process. This will reduce the apparent weight of water and give an unfavorable summation, though the other essential constituents may have been accurately determined.

It must also be borne in mind that a low summation can not be ascribed to the nondetermination of a constituent which is precipitated and weighed with others that have been determined, such as TiO_2 and P_2O_5 with Al_2O_3, or SrO with CaO. If it is due to incompleteness, the missing constituent must be sought for among those which are determined independently in the course of the analysis, such as CO_2, SO_3, Cl, $\dot{S}$, or BaO. If the deficiency be marked and the description of the rock indicates that none of such constituents are present, the low summation must be held as evidence of error somewhere in the analytical work.

It may also be noted in this connection that if ferric oxide is calculated as ferrous there will be a deficiency of one-ninth of its weight, due to the loss of oxygen, and the converse. Consequently, if the iron oxides are given only as FeO, the total of the analysis will be too low by one-ninth of the amount of ferric oxide really present. And conversely, if they are given as ferric oxide, the sum will be too high by one-tenth of the ferrous oxide. If the amount of either is considerable, as is usually the case in very femic rocks, the nonseparation of iron oxides may thus give rise to an apparently poor or an apparently good summation.

In the case of analyses of rocks containing such minerals as sodalite, fluorite, much biotite or apatite, pyrite or pyrrhotite, in which Cl, F, or S has been determined, it must be remembered that an equivalent amount of oxygen is to be deducted from the oxides of sodium, calcium, or ferrous iron, to arrive at a correct result. If the amount of these constituents is considerable, an apparently high summation may be found in reality to be perfectly satisfactory, while one which lies within the assigned limits may prove to be too low.

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[a] Hillebrand, Bull. U. S. Geol. Survey No. 148, 1897, p. 62.

In the case of a summation higher than that allowable, it is possible that this may be due to the determination of iron oxides as Fe_2O_3 only, the excess being attributable to the excess of oxygen in this over that in FeO, as just explained. Or it may be due to the fact that no correction has been made for the oxygen equivalent to Cl, F, or S, also mentioned above.

In the absence of these two possibilities, the high summation can be attributed only to analytical errors, such as impure reagents, imperfect washing of precipitates, incomplete ignition, a dusty laboratory, and the like. No explanation based on incompleteness and the nondetermination of some constituent will apply here, and, if the excess above the allowable limit be at all considerable, the evidence of careless work is strong.

Furthermore, in all cases of high or low summation, it must be remembered that the excess or deficiency can not be distributed among all the constituents, since "it is more than likely to affect a single determination."[a]

It must be borne in mind that the importance of the summation in rating an analysis lies in the fact that it is itself presumptive evidence of good or poor analytical work somewhere or all through the analysis. Thus, if the sum falls within the limits assigned for good work, the analysis is presumably good, provided that no marked discrepancy is evident between the analysis and the described mode, that the degree of completeness is satisfactory, and that there is no other evidence tending to throw doubt on the results.

On the other hand, if the sum is considerably below or above these limits, the evidence is much stronger than the apparently slight departure of a fraction of 1 per cent from the limits might at first sight seem to indicate that some error or errors have been made, and that consequently the character of the analytical work as a whole is open to suspicion. Thus a low summation of 99.00 may be due to the nondetermination of some constituent. In the absence of evidence to this effect, we can only conclude that some error has been made. This departure of but half a per cent from the limit of the standard of good work may affect either the silica or the alumina, those constituents present in largest amount, and may not seriously affect the value of the analysis; or it may affect some constituent present in less amount, thus being relatively of greater influence; or it may be distributed among several constituents. We have no means of deciding in the vast majority of cases, but we must conclude that as the work is certainly incorrect, even to so small an extent, in some particulars, it may be said we are almost justified in assuming that it is incorrect in others, and possibly all through.

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[a] Hillebrand, Bull. U. S. Geol. Survey No. 148, p. 63. Cf. Appendix to Fresenius's Quantitative Analysis.

Summations somewhat above or below the normal limits are excusable in analyses of many minerals or of meteorites where the material available is scanty and the allowable possible limits of error are consequently considerably greater than where the material is ample, as is generally true of igneous rocks. It must also be remembered, in the case of minerals, that their analyses may be checked by their agreement with the known theoretical chemical composition. In the case of rocks, on the other hand, we have, in the vast majority of instances, no such check, for adequately exact data as to the relative amounts of the constituent minerals are seldom given. If, therefore, the analysis of a rock is satisfactorily complete, there is no excuse, as Dr. Hillebrand remarks, for a summation that does not fall within the somewhat liberal limits here assigned.

PERSONAL FACTORS.

Analyst.—Of the factors that may come under this head the analyst himself is the most important. For several reasons, however, this factor can be used only with great caution and as subsidiary to other criteria. That is, an analyst is to be judged by his work rather than the work judged by the analyst. While as a general proposition it may be said that the work of a beginner will probably not be so good as that of an experienced analyst, yet exceptions do occur, so that we must not be too sweeping in our judgment of the analyses of a student unless they show definite signs of poor work. It may also happen that an experienced analyst turns out a number of analyses which are manifestly incorrect, probably owing to the employment of poor methods or reagents. In this case his very reputation will count for little, and a rock analysis made by him which can not be checked by comparison with the mode will be looked on with misgivings.

Methods.—The methods employed are so seldom stated that they are not often available as a basis of judgment. When known, however, the [illegible] of experience in rock analysis will be used to form an opinion of the value of the determinations affected by them.

Mutual checks.—Evidence of an indirect nature is sometimes afforded by analyses of the same or similar rocks by other analysts, which may either corroborate or discredit the analysis under consideration. It may thus happen, for instance, where the same analyst of a rock shows widely divergent [illegible], that the presumption is strong that the others are also unreliable [illegible] unless they can be checked by comparison with the mode.

COMPLETENESS.

It is obvious that to express fully and accurately the composition of a rock the correct amount of each constituent present must be determined. It follows that, in general, the more constituents determined the more closely will the analysis represent the composition of the rock. This, however, is subject to the limitations that some rocks are of such simple composition that they contain only a few chemical constituents, and that the statement of figures for all constituents possibly present is by no means a guaranty that they have been correctly determined. Assuming, however, that the analysis is accurate, and that the rock is of more or less complex composition, as is usually the case, we may briefly discuss the relative importance of the various constituents in the rating of analyses.

Speaking generally, and bearing in mind the possible occurrence of rocks containing large amounts of minerals usually regarded as rare or which are usually only sparingly present, it may be laid down that for the most satisfactory work every constituent should be determined which is present in greater amount than mere traces, as already defined, or the knowledge of whose absence or presence, even in minute quantity, is of importance to our study of the rock or to the object of the investigation.

This will include the nine main constituents that are almost universally present and whose absence is a matter of great interest; that is, SiO_2, Al_2O_3, Fe_2O_3, FeO, MgO, CaO, Na_2O, K_2O, and H_2O. The iron oxides should be separately determined, or the absence of one or the other should be shown, even in the case of the most salic rocks, though it must be borne in mind that the importance of this separate determination increases with increase of the femic components. Likewise, the alkalies should always be determined, of course separately, and even in the case of the most femic rocks their presence in traces or their complete absence should be definitely proved. CaO and MgO should also be determined, even though they exist actually as traces, as defined above. H_2O should, in general, be determined directly, and not by "loss on ignition," but the distinction between that below and that above 110° is not usually essential, yet is always advisable. CO_2 should, however, be determined if the rock is not fresh.

After these it is of next importance to know the amounts of the so-called minor constituents which are present in notable amount. This will include TiO_2 and P_2O_5 in nearly all rocks, except the most salic ones, Cl and SO_3 in rocks rich in sodalite, noselite, or haüyne, S in a good many femic rocks, ZrO_2 in rocks with nephelite, much eudialyte, or zircon, Cr_2O_3 and NiO in many dofemanes and perfemanes, etc.

Of course any one of these may at times assume the importance of one of the nine main constituents, as TiO_2 in ores produced by segregation or differentiation, Cl and SO_3 in such rocks as taimyrite, tawite, and the hauynophyr of Melfi, P_2O_5 in the apatite-syenites of Finland, or Cr_2O_3 in many dunites.

Coming next to the constituents present in only very small amount, the most important are TiO_2 and P_2O_5, especially the former. These are both almost always present, and are also of special importance because their estimation affects that of the highly important Al_2O_3, as already explained. In fact, on this account these two should always be determined if the analysis is to be considered a good one. MnO, although also nearly always present, is of comparatively little influence, and its determination or not, for reasons explained above, should not be held to affect seriously the rating of the analysis.

Of the other, generally rare or very minor, constituents, such as ZrO_2, Cr_2O_3, NiO, BaO, SrO, little need be said. Except as they assume an important rôle, as already mentioned, they scarcely affect the value of an analysis for general purposes. Still, since they are or may be of great importance for the study of certain broad and as yet undeveloped problems, and as their determination, other things being equal, is evidence of careful and thorough analytical work, analyses in which they are reported must be rated higher than those in which they do not appear.

RATING ADOPTED IN THE TABLES.

We come now to the practical application of the foregoing remarks—that is, a concise expression of our judgment of the value of any given analysis, based on the features described. We have been accustomed to do this in a rough way by calling analyses good, or poor, or bad. But there seems to be a growing need of making these terms more precise, of defining their meaning more exactly.

As a preliminary, the fact must be recognized that while the features discussed permit of a fairly accurate judgment in many cases, in others some or all of them are not available, and the analysis must be taken, so to speak, at its face value.

Thus it frequently happens, especially with the prevalent almost purely qualitative descriptions, that we can form no estimate of the correspondence of the analysis with the mode. In a gabbro, for instance, of which it is merely known that the constituent minerals are labradorite and augite, the analysis may show high Al_2O_3 and low MgO. This may be due to the common error in the separation of these two; or again, it may be due to the fact that the rock is very salic, so that the anorthite molecule is very abundant and the alferric mineral present in small amount, though the rock would be called a gabbro, equally with a very femic one, in the present vague and qualitative systems. In the first case the analysis would not, and in the second case it would, correspond with the mode, and the analysis would be, respectively, either incorrect or correct. But in the absence of some evidence to determine the matter, such as an indication of the quantitative relations of the two minerals in the description, we should have no means of deciding the question provided that CaO was high enough, and if the analysis were otherwise good we should scarcely be justified in rejecting it on this account.

We must also make the general assumptions, in the absence of evidence to the contrary, that the material analyzed is representative of the rock-mass, and that the analyst is competent and the methods employed reliable.

Admitting these serious defects in the case of many present-day analyses, and the fact that any such concise characterization is necessarily to a large extent arbitrary, I venture to propose, and have used throughout the collection, the following scheme as a practical method for the expression of the rating of analyses.

The method is closely analogous to that of Bradstreet in rating the credit of mercantile houses in the United States, which, indeed, suggested the present form of the scheme. In commercial rating the credit of a firm is dependent on two factors—the amount of capital invested or at command and the personal character and reputation of the individuals. The rating or credit will be high as the personal character and the capital both approach the maximum.

Following out this analogy, and leaving external evidence aside, our judgment of analyses is chiefly dependent on two factors—the accuracy and the completeness. For the purposes for which rock analyses are used each of these compensates or may replace the other to a certain extent. Thus if the analysis is not very complete, this fault may be partially compensated for by the accuracy of the determinations which have been made, and, conversely, if the accuracy of some of the determinations is not entirely satisfactory, a complete determination of all the constituents may partially make up for it. This, of course, within reasonable limits. Furthermore, the higher the standard of each factor the more valuable will be the analysis.

To express the degree of accuracy the letters A, B, C, D are used, and for the degree of completeness the figures 1, 2, 3, 4. These are used in combinations of a letter and a figure, the former preceding, since, in general, the degree of accuracy is of more importance than that of completeness. The bases on which these are assigned are as follows, the limitations and often the arbitrary character of the scheme being understood:

A is used when the analysis gives evidence of the highest degree of accuracy, that is, when it corresponds well with the mode, and when the summation is between the limits 99.50 and 100.75. When the analyst is of the first rank and when the methods are known to be of the best, this is additional reason for the assignment of this letter. It must be understood, however, that in the collection I have carefully refrained from the use of the personal competence of the analyst in the assignment of ratings, as this is often a difficult, and always a delicate matter. So, with the exception of a few cases where the methods or general results were known to be not very reliable or positively bad, I have used only the purely impersonal features of each analysis in deciding its rating.

B may be assigned when the analysis and the mode correspond and when the summation is between 99.50 and 99, or between 100.75 and 101.25. Due allowance must, however, be made here as elsewhere, in the case of low summations, for the effect of the nondetermination of certain constituents, as already explained, and in the case of high ones for the correction to be applied in the presence of Cl or S.

C applies when the analysis corresponds fairly well, or varies but little from the mode, or when the sum is between 99 and 98.50, or between 101.25 and 101.75.

D is to be used when the analysis varies decidedly from the mode in any important particular, or when the sum is below 98.50 or above 101.75. It also applies when the methods for the determination of important constituents are known to be bad, or when an analysis, apparently good, is made up by combining parts or the whole of two or more poor analyses.

1 is assigned when the analysis is perfectly complete or nearly so, as when, in addition to all the main constituents and those of secondary importance, ZrO_2, Cr_2O_3, NiO, BaO, SrO, and the like, or several of them, are determined in rocks not containing notable amounts of minerals having these as essential components. In general MnO should be determined for this rating, but not necessarily so, and the same is true of the separate determination of combined and hygroscopic water, though the determination of water as "loss on ignition" renders this rating doubtful. The iron oxides should be separately determined in all cases to have this figure apply.

2 will be used when all the main constituents, including both oxides of iron, have been determined, as well as the constituents of secondary importance, including TiO_2 and P_2O_5 in nearly all rocks, Cl and SO_3 in those with abundant minerals of the sodalite group, and so on, as has been explained. The minor constituents, as ZrO_2, BaO, etc., are not determined for this figure. 2 will also be used for analyses of salic rocks in which the iron oxides are present in small amount but have not been separated, and which are otherwise so complete as to fall under 1.

3 applies to analyses in which the main constituents, including both oxides of iron, have been determined, but not TiO_2, P_2O_5, Cl, etc. (or the minor constituents), unless minerals rich in these are so abundant as to make their estimation of the same importance as that of the main constituents. 3 also includes analyses of rocks low in iron oxides, in which these have not been separated, but which are otherwise complete according to the requirements of 2.

4 is to be assigned when, in all rocks except those very low in them, the iron oxides have not been separated, when the alkalies or other constituents are determined by difference from 100 per cent, when the alkalies are not separated, when any constituent of the first importance is not determined, when the analysis has been made of ignited material (not including drying at 110°), or when it is given, without the original figures, as having been recalculated on a water- or carbonic-acid-free basis.

Under the working plan already described, one of these factors compensates for the other to a certain extent. Thus a less degree of completeness is compensated for by a greater degree of accuracy. We would then judge, for example, an analysis of rating A2 and one of rating B1 to be of about equal value. This is, confessedly, only true within limits, and must be used with judgment and with a recognition of its empirical character.

To express, then, the various ratings of equal value we can employ five series of terms as follows: Excellent or first rate, good or second rate, fair or third rate, poor or fourth rate, and bad or fifth rate. Their meanings, in terms of the symbols chosen, will be seen in the subjoined table, ratings of the same value falling on the same horizontal line.

First rate	A1				Excellent.	Superior.
Second rate	A2	B1			Good.	
Third rate	A3	B2	C1		Fair.	
Fourth rate	A4	B3	C2	D1	Poor.	Inferior.
Fifth rate		B4	C3	D2	Bad.	
			C4	D3		
				D4		

In other words, analyses of the rating A1—that is, perfectly satisfactory both as to accuracy and completeness—would be called either "excellent" or "first rate," the two terms being synonymous. An analysis to which is assigned the rating either A2 or B1 would be spoken of as "good" or "second rate." One with either of the three ratings A3, B2, or C1 would be called "fair" or "third rate;" one with the rating A4, B3, C2, or D1, a "poor" or "fourth rate" analysis; while one worse than these would be "bad" or "fifth rate."

In any case, it must be remembered that accuracy should count rather more than completeness, since often an approximate correction can be made for constituents not determined, as in the case of TiO_2 and P_2O_5 affecting Al_2O_3. Consequently, though of the same general rating, an analysis to which may be assigned the symbols A2 is worth rather more than one to which B1 applies, and similarly with those assigned to A3, B2, and C1 in the order of merit.

As a mnemonic convenience it may be useful to note that, replacing the letter indicating accuracy in any given rating by its serial number in the alphabet, the sum of this and the figure indicating completeness will be one unit greater than the rating of the analysis. Thus in a first rate analysis, of rating A1, the sum will be 2; in a second rate analysis, of rating A2 or B1, the sum will be 3; in a third rate one, of rating A3, B2, or C1, the sum will be 4. In the case of fifth rate analyses, however, the sum may be greater than 6, as, for instance, in the rating D4, where it will be 8.

As will be seen presently, analyses of the first three ratings—that is, excellent, good, or fair—are worthy of use in petrological discussions, while those of the fourth or fifth rate, poor or bad, are of little or no use. In order to be able to distinguish between the two it will be well to have some short terms expressing the difference. I would suggest, therefore, that excellent, good, and fair analyses be spoken of collectively as *superior*, while poor and bad ones will be *inferior*.

It may be advisable to extend these ratings by using, for instance, E for a still lower degree of accuracy and 5 for an analysis hopelessly incomplete. Thus, E might be used when the alumina and magnesia, the iron oxides, and the alkalies are all manifestly incorrect, or when the sum is below 98.00 or above 102.00; for a number of such analyses may be found. Similarly 5 might apply when the iron oxides are not separately determined and also when the alkalies are given by "difference." But E and 5 have not been used here, because this scheme of rating is, in a way, tentative, and also for the reason that when an analysis is so bad as to call for a D or a 4 it seems scarcely worth while to indicate further degrees of inferiority.

On the other hand, it may be advisable in the future to indicate a higher degree of accuracy or completeness than is generally implied by A and 1. Thus, while A will apply to the general run of excellently accurate work, we might wish to distinguish that of a still higher order, as the best of that which Drs. Hillebrand, Stokes, and Steiger have done. This may be accomplished by the use of A*. Similarly it may be useful to discriminate analyses having such a degree of completeness as is found in Hillebrand's analyses of the rocks of the Leucite Hills, in which everything possibly present has been determined, from those in which some, but not all, of the rarer constituents have been estimated. This would involve the use of 1*. A combination of A* and 1* might be called "perfect," the word being used subject to human limitations. There does not as yet seem to be much need of this distinction, though it will undoubtedly be more advisable in the future than the discrimination between degrees of badness, as just described.

In using these ratings it must be remembered that they indicate the *general character* of the analysis. Some features may justify us in calling the analysis as a whole either poor or bad, and yet it will be of use in a limited way. Thus, the iron oxides may not be separated, or the common error may be made in regard to alumina and magnesia, so that the analysis must be rated as fourth or fifth rate, *taken as a whole*. At the same time it may be, as often happens, that the lime and alkalies, for instance, have been correctly determined, as well as the silica, so that for purposes in which only these determinations are of importance the analysis may be useful to this extent. But, notwithstanding this, in view of the evident errors present, the analysis can not be regarded as satisfactory.

The question now arises as to what ratings are practically of use. Leaving out of account cases such as those just mentioned, where utility attaches to some single determinations, it may be held that, for general purposes, only first or second rate (excellent or good) analyses should be countenanced or used by petrographers. The high standard set by the chemists of the United States Geological Survey should be adopted by all, and the chemical side of petrology should be established on as firm and satisfactory a basis as is the microscopical.

At the same time it will very frequently happen that an otherwise good analysis in which the more important of the minor constituents have not been determined, such as TiO_2 and P_2O_5, will be of use for very many purposes, such as the classification of the rock. Third rate or "fair" analyses may therefore be considered usable, especially if of high rate as to accuracy, since, in many cases, corrections may be applied for constituents which have not been determined.

Excellent, good, and fair (superior) analyses may therefore be considered usable, while poor or bad (inferior) ones must be rejected in any discussion, unless the elucidation of a special point for which some of the reliable determinations may serve is the only question at issue.

DISCUSSION OF THE TABLES.

DIVISION INTO PARTS.

As will be explained below, it was desired to arrange the analyses embraced in the collection according to the new system of classification. For the majority of analyses of course this was perfectly feasible, but it was soon seen on critical study of them all that only a part could or should be thus treated.

There were found to be, for instance, a surprisingly large number in which the iron oxides had not been determined. While this is of comparatively small importance in analyses of persalanes, where these constituents are present only to the amount of 1 or 2 per cent, it becomes a most serious matter in the other classes. Indeed, if the iron oxides amount to more than about 2 per cent and are not separately determined, it is generally impossible to classify the rock with certainty, since some assumption must be made as to the real state of oxidation of the iron, and this will not, in all likelihood, be in accordance with the facts.

If the iron is assumed to be present as ferric oxide alone, this must be calculated to find the norm as hematite, thus freeing an amount of silica equivalent to the ferrous iron really present, which will alter the relative amounts of the other minerals, or change lenads into polysilicate feldspars, or olivine into hypersthene. On the other hand, if all the iron is assumed to be ferrous, which we have established as the rule to follow in such cases for the sake of uniformity, an amount of silica will be needed to satisfy this which would not be used if part of the iron were ferric, and this would have the reverse effect on the other normative minerals to that just mentioned.

It will, of course, be equally at variance with the probably true state of affairs to make any other intermediate assumption, such as, for instance, that ferric and ferrous oxides are present in equal amount, the iron being thus assumed to be present in the rock only in the form of magnetite.

We are therefore compelled to reject nearly all such analyses for the purpose of classifying the rocks of which they have been made, as we have previously stated.[a] Along with them must go a large number in which it is certain that the alumina is much too high and the magnesia correspondingly low, or in which we know, from the descriptions, that there must be a very notable amount of TiO_2 which has not been determined, and which consequently serves to raise the apparent amount of alumina. In these cases the salic lime, and therefore the normative anorthite, will be too high and the classificatory position of the rock consequently false.

The point may be raised that this is a serious objection to the new system of classification, which thus demands the determination of these constituents in the analyses. In the old systems such imperfect analyses could be and were used, or inserted in papers, though they were admittedly faulty in these respects. To the critic, however, who examines the question in an unprejudiced way, this will be seen to be not an objection, but really a very strong point in favor of the new system. For it postulates as fundamental to the classification the absolute necessity for only the best class of analytical work. And it is a self-evident fact that this science, like any other, must be satisfied with only the highest class of data in all its departments. The admission of admittedly defective elements into any classification only tends to weaken the whole and to delay the progress of the science.

There were also found a very large number of analyses that were obviously so bad in other respects as to be almost or wholly worthless. It is needless to cite instances. They may be found throughout the whole of Part II.

Analyses of tuffs and ashes, and of rocks so badly decomposed as to be far from their original composition, were also found in abundance. Though many of these are analyses of the highest ratings, yet they obviously were of no use for purposes of classification, and hence could not logically be correlated with those of massive or unaltered rocks.

The problem as to what should be done with all these cripples and invalids was finally solved by resort to segregation from the sound and healthy analytical individuals, and the collection was divided into two parts.

Part I.—Here are to be found all the superior analyses, of the first three ratings, excellent, good, and fair, except those of tuffs, ashes, and more than slightly decomposed rocks. With them were also put a few inferior analyses of the last two ratings, poor and bad, which were deemed to be of especial interest and importance, or which were almost the only examples available for illustrating the chemical and mineralogical composition of the divisions into which they seemed to fall. Although, as a general rule, analyses in which the iron oxides had not been separately determined were rejected from this part, yet in the persalane class a number of otherwise good ones were inserted, since the total amount of these oxides was small, and the neglect of their separation would not affect their classificatory position. For reasons to be given later, all these analyses in Part I were classified according to the new system, but the position of rocks of which the analyses are untrustworthy for any reason must be regarded as merely provisional, and subject to alteration in the future on the basis of new and better analyses.

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[a] Cross, Iddings, Pirsson, Washington, Jour. Geol., Vol. X, 1902, p. 646; also The Quantitative Classification of Igneous Rocks, 1903, p. 190.

Part II.—In this part were placed all the inferior analyses of the last two ratings, poor and bad, except those admitted to Part I for reasons just given. These analyses to be found in Part II will include by far the greater portion of those in which the iron oxides have not been separated, especially those of rocks belonging to Classes II, III, IV, and V. As has been seen, some of those which are faulty in this respect, but which are of persalane rocks, are to be found in Part I. Analyses of tuffs and ashes and of decomposed or altered rocks were also placed in Part II, even though they are of the highest rating.

The analyses in Part II are classified according to the scheme given in Zirkel's Lehrbuch (I, 1893, p. 829). This was adopted in preference to the system of Rosenbusch, because it is primarily based on chemical distinctions to a greater extent than the other, which gives structure and geological mode of occurrence the more fundamental position. According to the order which Zirkel follows in his text-book, the granites, the quartz-porphyries, and the rhyolites, for instance, come close after one another, while according to Rosenbusch they would be widely separated. As this is a collection of rock analyses, the presumable main use of which will be their correlation, Zirkel's arrangement was deemed to be the most advisable to adopt.

The analyses, then, in Part II will follow in the sequence given in the tables of contents of the second and third volumes of Zirkel's Lehrbuch. But some new types, which have been described or named since the appearance of that work, or which were omitted from it, have been placed in this system where they seem to belong most logically, or in the position they should take as indicated by Rosenbusch. In cases of uncertainty on the part of the reader the index to the old rock names will be found useful.

Within each of Zirkel's groups, whether large or small, the analyses are arranged on a geographical basis, which is that followed in Part I, and a description of which will be found on page 64. The rock names used in each case are those given by the original authors.

BASIS OF ARRANGEMENT OF ANALYSES.

ATTEMPTED USE OF CURRENT PETROGRAPHIC SYSTEM.

When this collection was first started, two or three years ago, the analyses were classified according to the system of Rosenbusch. Generally the name given by the author to the rock was adopted, but in many cases the name seemed to me to have been wrongly applied, when I took the liberty of renaming the rock, keeping the author's name in brackets. As the collection progressed this became a frequent occurrence, as was by no means surprising in view of the loose principles, the subjective and qualitative character, and the vague definitions of the systems in vogue. It furnished a most striking illustration of their illogical, inconsistent, and unsatisfactory character, and was a most cogent argument against their continued use. It indicated, indeed, that there was in reality no one system to which one could turn for guidance, but that each petrographer had been forced to set up his own standards to some extent, to make his own definition of many of the terms in use, or to assign his own limits to them, which might or might not correspond with those of others—in a word, partially to make his own classification and nomenclature. Each was a hodgepodge, made up of bits taken from this or that authority, or evolved from the individual author's own ideas. There was seldom if ever any broad principle which one could apply throughout, and the result was a clashing of principles, inconsistencies everywhere, and a lack of harmony and even development. If one had been engaged on a certain group of rocks the private classification in that group would be very detailed, while in other more neglected spots the names given would be few, and the classification of some authority would be used with no critical estimate of its applicability and no thought of its logical consistency with the other more detailed and familiar parts of the scheme.

Everyone has recognized this vaguely, but it is forced upon one when a large collection of rock analyses is undertaken and a careful comparison is made between the descriptions and analyses and the names applied by the many writers consulted.

Roth[a] has, though much more concisely, expressed somewhat similar views as to the condition of affairs, and is inclined to think that no one system will ever receive general acceptance. The present writer is less pessimistic, and regards the lack of any universally adopted system of classification as due less to the difficulties caused by the characters of rocks than to the general lack of appreciation of the necessity for logical and consequent principles, and to a natural disposition to patch up the old rather than to substitute something totally new, even though better.

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[a] Roth, J., Chem. Geol., Vol. II, 1883, p. 41. Cf. Cross, W., Jour. Geol., Vol. X, 1902, p. 473.

ADOPTION OF THE QUANTITATIVE SYSTEM.

During the progress of the collection the writer became interested, with Cross, Iddings, and Pirsson, in the working out of the system of classification and nomenclature of igneous rocks which has been recently proposed by us. In the course of this work the growing collection of analyses was continually appealed to, the modes of many of the analyses were calculated, and they were shifted and rearranged from time to time to test the various propositions or suggested lines of classification till all agreement with any system at present in use was lost.

After having arrived substantially at the system of classification which was finally adopted, it was seen that the collection arranged in accordance with this would not only be its best exponent, but would be an indispensable foundation for purposes of nomenclature, the consideration of which was taken up only after the main features of the classification had been disposed of.

The collection was therefore finally arranged as far as possible in accordance with the new system, and, with the approval of my colleagues, it was decided to publish it in that form.

Most of those who use these tables will have had some acquaintance with the system spoken of, for a full description of which the reader must be referred to the original paper,[a] where both the classification and the nomenclature are described at length. But for the benefit of those to whom the original paper is unknown or inaccessible, a brief summary of its main features may be given here.

QUANTITATIVE CLASSIFICATION OF IGNEOUS ROCKS.

CONSTRUCTION OF THE SYSTEM.

The system is a quantitative chemico-mineralogical one. All igneous rocks are classified on the basis of their chemical composition, and all rocks of like chemical composition are grouped together. The definition of the chemical composition of a rock is expressed in terms of certain minerals capable of crystallizing from a magma of the given chemical composition, and the expression is quantitative. For this purpose the rock-making minerals are divided into two groups, consisting on the one hand mainly of the alkali and lime alumino-silicates, and on the other of the nonaluminous ferromagnesian ones. The first is called mnemonically the *salic* group, the latter the *femic* group. From these categories the aluminous pyroxenes and amphiboles and the micas are excluded for reasons given in full in the paper cited.

To completely classify a rock by this system its chemical composition must be known by chemical analysis or by physical or optical means. Here we have only to deal with the first of these. Since a given magma may crystallize into different mineralogical combinations, according to the circumstances attending its solidification, it is necessary to select a certain set of salic and femic minerals as uniform standards of comparison. In practice the molecular composition of a rock, obtained from its chemical analysis, is computed by a regular method into amounts of these standard minerals, and the place of the rock in the system is then easily determined.

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[a] Cross, Iddings, Pirsson, Washington, Jour. Geol., Vol. X, 1902, pp. 555 et seq. Also Quantitative Classification of Igneous Rocks, Chicago, 1903, pp. 95 et seq.

The standard mineral composition so obtained is called its *norm*, and will be found in these tables in the column under this heading, for every rock classified by this system. The norm may or may not agree with the actual composition or *mode*.

On the relative proportions of the two groups of standard minerals, salic and femic, present in the norm, the rocks are first divided into five *classes*, according as one or the other of these two groups alone constitutes the norm, or is extremely abundant; whether one or the other is dominant, or whether the two are present in about equal proportions.

The classes thus formed are divided into *orders* on the relative proportions of the minerals forming the predominant group in each case, and in the middle class on the relative proportions of the minerals of the salic group. Thus in the preponderantly salic classes the orders are based on the relative amounts of quartz, feldspars, and feldspathoids (lenads).

The orders are divided into *rangs* on the basis of the chemical character of the basic oxides in the minerals of the preponderant group in each case; thus if these were feldspathic, as to whether they were alkalic, alkalicalcic or calcic; if they were ferromagnesian, as to the relations of femic alkalies, femic CaO, and (Fe, Mg)O.

Rangs are further divided into *subrangs* according to the proportions of the variable basic oxides present in each case. Thus, if these are alkalies, on the relations of soda to potash; if ferromagnesian, according to the ratio of magnesia to ferrous oxide. A lower division, the *grad*, obtains only in the three intermediate classes, and results from a consideration of the relative amounts of the minerals composing the subordinate femic or salic group. In the present collection, however, this division will not be used, the subrang being the lowest division to which the classification is here carried, for reasons to be explained presently. In addition to the above divisions, further ones are provided for where necessary by *subclasses*, *suborders*, *subgrads*, and *sections* of all of the divisions.

The actual mineralogical composition, or mode, and the texture are considered of minor importance in classification, and are only taken into account after the chemical or magmatic characters have been disposed of. They are not considered in the collection.

NOMENCLATURE OF THE SYSTEM.

As the system demands an entirely new nomenclature, it has been sought to introduce this according to a definite method, the lack of which is so painfully evident in that at present in use. The nomenclature proposed consists of three parts: Primarily, of substantive names for the magmatic units, implying the chemical composition and the norm; secondarily, of two sets of adjective terms qualifying the magmatic names, one set referring to the actual mineral composition or mode, the other to the texture. Of these, only the first concerns us here.

The magmatic name consists of a root, derived from a geographical name in all cases, except for the names of classes and subclasses, and of a suffix. The suffixes are so chosen as to vary in a definite way with the division of the system to which the magmatic name belongs. Thus, for class, order, rang, and grad the letters *n*, *r*, *s*, and *t*, in alphabetical order, are used respectively, with the vowel *a*, giving in English *ane*, *are*, *ase*, and *ate*. For subclass, suborder, etc., the vowel is changed to *o*, giving *one*, *ore*, *ose*, *ote*. For sections *i* is inserted before the ending.

The roots of the names for classes are *sal* and *fem*, mnemonic of the salic and femic groups constituting their norms, and are combined with prefixes yielding the following terms: Persalane, dosalane, salfemane, dofemane, perfemane.

The roots for the names of the divisions smaller than subclass are derived from the names of geographical localities, and as far as possible from those at present in use for rock names, advantage being taken of their connotations as to magmatic character. The roots for the names of the orders, however, are derived from the names of countries, as the concepts implied by them are broader than, and are not covered by, any of the names in present use.

COMPARISON OF OLD AND NEW NOMENCLATURES.

The rocks being classified according to the new system, it follows, as a matter of course, that the nomenclature constructed by us for that system is used here. This has the further advantage of illustrating by concrete examples the various divisions, as well as that of indicating the source of the roots of the magmatic names.

As, however, it may seem to many, on looking over the tabulated names, that we have added much to the difficulties of the petrographer by a flood of new names, we may briefly examine this question and see whether objections based on this are really justified, granted the logical necessity for a new nomenclature to express the ideas of the new classification.

It will be found on examination of the tables that there are 257 magmatic names proposed by us, from class to subrang. A large proportion of these, however, differ from one another only in the terminations which successively narrow the connotation of the root. This, of course, greatly facilitates their comprehension, since, given the knowledge of the meaning of the name of a rang, as that liparase is peralkalic, it is a very easy matter to remember that a given subrang with the same root has a certain narrower character, as that liparose is sodipotassic.

Furthermore, a certain proportion have roots derived from the names of the old systems, which, by constant usage in the past, will carry connotations as to their magmatic character. Thus the root *lipar* conveys the two ideas that the silica is high (modal or normative quartz being consequently present), and that only alkali feldspars are found (i. e., alkalies greatly in excess of lime), the rock being peralkalic.

The names and roots may be tabulated as follows, sections of orders and sections of rangs being placed under these respective divisions:

	Number of names.	Roots.		
		Old.	New.	Total.
Class	5	....	5	5
Subclass	5	....	....	....
Order	40	....	40	40
Suborder	2	....	1	1
Rang	86	35	31	66
Subrang	119	18	39	57
	257	53	116	169

Let us see how these compare as to number with the old names, taking into account only the roots of these, unqualified by mineralogical or textural additions. Thus *andes* will be counted only once, and such names as biotite-andesite, andesitophyre, trachyandesite, andesite-porphyry, etc., will be neglected.

Undoubtedly the most comprehensive list of rock names now in print is that found in Loewinson-Lessing's Lexicon, published in 1901.[a] In this there are 207 locality and other roots used in forming names of rocks. The index to the last edition (1896) of Rosenbusch's Massige Gesteine shows 182 name roots. Both of these are undoubtedly somewhat too low, as some new names have appeared since their publication, and a few older ones have been omitted.

Taking them as they stand, it will be seen that the total number of new names proposed by us thus far is not greatly in excess of those in the old systems. The difference is still more marked when the roots of the new system are considered. These only amount to 169, against the 207 of the old, of which, furthermore, 53, or nearly one-third, are borrowed from the old names, and hence carry some connotation as to their significance.

Inspection of the small table above will also show that about 30 per cent of the new roots are allotted to the classes and orders. Here they are absolutely necessary because these divisions imply concepts much broader than, and quite distinct from, any to be found in the old systems. Of these, the class and subclass names are self-explanatory. Of the ordinal names, many, such as canadare, russare, norgare, lappare, and finnare, while not derived from present rock names, yet carry in themselves quite evident petrographical implications.

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[a] Comptes Rendus VIIIe Cong. Géol. Int., Paris, 1901, pp. 1009-1302.

In view of the facts thus briefly presented the nomenclature of the new system can scarcely be considered overpowering as to the number of new names, compared with the old.

It is true that two objections may be raised against this conclusion. One would be that, even only carrying the classification as far as subrangs, there are numerous vacant spaces, indicated in our tables by x, as well as many others which are so far unrepresented by known rocks. To this the answer may be made that the new names for these spaces will come more or less gradually, and will hence be easily assimilated. A great many of them, also, will be applied to rocks which occur in divisions representing magmas of unusual chemical character, and which would, therefore, even under the existing systems, be deserving of, or at any rate would receive, new names. We shall in any case be spared, to a great extent, the flood of new names given to rocks having chemical and often mineralogical characters identical with those of well known ones, the only excuse for which seems to be some slight difference in texture, mode of occurrence, or accessory minerals.

New names, under the system proposed, could or should be bestowed only after careful chemical analysis or an equivalent microscopical estimate of the mode on which to base the norm. A clear understanding of and adherence to this fundamental principle of the new nomenclature will do much to check any rash attempts at the bestowal of new names, and will render those proposed in the future, under the new system, worthy of consideration, and make them precise as to their meaning, which certainly can not be said in all cases of those proposed during recent years.

The other objection that might be raised is, that no account has been taken in the preceding remarks of the names which will be needed for grad and subgrad names. It must be remembered in this connection that no such names will be needed for the persalanes and the perfemanes, which, as will be seen later, constitute nearly 40 per cent of known rocks. They will also be of comparatively limited use for the dosalanes and the dofemanes, to which belong about another 40 per cent of known rocks. In the salfemane class, however, to which belong the remaining 20 per cent of rocks, they will be probably much needed and used.

Even thus, however, and even assuming the pressing need for such distinctions in Classes II and IV, this can not be considered a very serious objection. In the first place, these names, like those for the other divisions of higher taxonomic value, will come more or less gradually and will therefore be learned with comparative ease. In the second place, as we have already indicated, these gradal and subgradal distinctions may, and will, often be exactly expressed conveniently by adjectives indicating the type or habit, so that the nomenclature will probably tend to become binomial.

As regards the number of possible grads also, a little consideration will show that they can not be as numerous as might appear at first sight. For, from the principles regarding the distribution of silica which control the method of calculating the norm, a very considerable proportion of the grads which at first sight seem possible can not actually exist. Thus, in the first three classes, if quartz is present among the salic minerals there can be no olivine or akermanite among the subordinate femic minerals, so that the grads characterized by the presence of these will not be possible. Similarly, if leucite or nephelite be present among the preponderant salic minerals there can be no grads based on hypersthene. Again, with anorthite present, grads characterized by acmite can not exist. Akermanite also can not be present if there is any feldspar in the norm.

It must also be borne in mind, in considering these matters, that the new names indicate the chemical character of the rock with a degree of precision and clearness quite impossible with those of the older systems. Thus the old name "diorite" implies nothing more than a holocrystalline, granular, igneous rock, composed essentially of a plagioclase (of almost any kind) and dark minerals, chiefly hornblende or biotite, these and the feldspar being present in almost any proportions. The variety of dark mineral may be indicated, when such precision is desired, by the prefixing of the appropriate mineral name. The new nomenclature, on the other hand, will indicate the texture and mode by the use of the prefixes grano and either hornblende or biotite, and will also indicate exactly the chemical character of the rock by the use of one of half a dozen magmatic names, leaving the reader in no doubt as to the complete character of the rock, magmatic, modal, and textural, as well as the relative proportions of the minerals.

It might also be added that even if the number of new names necessary were ten or a hundred fold those suggested in our tables, petrographers would be still in a far happier condition than their colleagues in paleontology, zoology, or botany, with the thousands and tens of thousands of names and their connotations with which it is absolutely essential that they should be acquainted.

It must be remembered that petrography is really young as compared with these sciences, so that, being near the beginning, we enjoy a great advantage over workers in them in respect to the ready acquisition of any nomenclature; and that, furthermore, it scarcely seems probable that, even granting the need for the recognition of very minute differences in rock characters, the number of names ever called for in petrography will approach those needed in the organic sciences, or even in chemistry.

TABULAR EXHIBIT OF DIVISIONS AND NAMES OF QUANTITATIVE SYSTEM.

There is appended a tabular list of the divisions and the names proposed for the new system, which is similar to that published in the original paper and book, except that a few additional names proposed by us have been inserted. To each name is also added, in brackets, the number of superior analyses, *of the first three ratings* (excellent, good, and fair), which are to be found in Part I of the collection in the case of every division. These will be referred to and used in certain calculations subsequently.

TABLE I.—CLASS I, PERSALANE (652).

ORDER	1. Victorare (0)	2. Belgare (12)	3. Columbare (125)	4. Britannare (378)	5. Canadare (89)	6. Russare (45)	7. Tasmanare (3)	8. Ontarare (0)	9 ....(0)
RANG 1	....	1. Dargase (0)	1. Alaskase (47)	1. Liparase (110)	1. Nordmarkase (39)	1. Miaskase (37)	1. Laugenase (3)	1..........	1..........
Subrang 1 .	....	....	1. x (1)	1. Lebachose (3)	1..........	1..........	1..........		
Subrang 2 .	....	....	2. Magdeburgose (9)	2. Omeose (9)	2..........	2..........	2..........		
Subrang 3 .	....	....	3. Alaskose (31)	3. Liparose (78)	3. Phlegrose (16)	3. Beemerose (3)	3. x (1)		
Subrang 4 .	....	....	4. x (3)	4. Kallerudose (12)	4. Nordmarkose (20)	4. Miaskose (33)	4. Laugenose (2)		
Subrang 5 .	....	....	5. Westphalose (3)	5. Noyangose (8)	5. Tuolumnose (3)	5. Mariupolose (1)	5..........		
RANG 2	....	2. x (6)	2. Alsbachase (51)	2. Toscanase (191)	2. Pulaskase (39)	2. Viezzenase (8)	2..........	2..........	
Subrang 1 .	....	1. x (2)	1..........	1..........	1..........	1..........			
Subrang 2 .	....		2. Mihalose (6)	2. Dellenose (6)	2. Vulsinose (4)	2..........			
Subrang 3 .	....	2. x (2)	3. Tehamose (25)	3. Toscanose (109)	3. Pulaskose (15)	3. x (1)			
Subrang 4 .	....	3. x (2)	4. Alsbachose (16)	4. Lassenose (73)	4. Laurvikose (19)	4. Viezzenose (7)			
Subrang 5 .	....		5. Yukonose (1)	5. Mariposose (3)	5. x (1)	5..........			
RANG 3	....	3. x (5)	3. Riesenase (26)	3. Coloradase (75)	3. x (4)	3..........	3..........		
Subrang 1 .	....	1. x (3)	1..........	1..........	1..........				
Subrang 2 .	....		2. x (7)	2. x (0)	2. Mazarunose (1)				
Subrang 3 .	....	2. x (1)	3. Riesenose (11)	3. Amiatose (17)	3. x (1)				
Subrang 4 .	....	3. x (1)	4. x (5)	4. Yellowstonose (56)	4. x (2)				
Subrang 5 .	....		5. Vulcanose (3)	5. Amadorose (2)	5..........				
RANG 4	....	4. x (1)	4. x (1)	4. x (2)	4. Labradorase (6)	4..........			
Subrang 1 .	....	1. x (1)	1. x (0)	1..........	1..........				
Subrang 2 .	....	2..........	2. x (1)	2..........	2..........				
Subrang 3 .	....	3..........	3..........	3. x (2)	3. Labradorose (6)				
RANG 5	....	5..........	5..........	5..........	5. Canadase (1)				

TABLE II.—CLASS II, DOSALANE (676).

ORDER	1.............(0)	2...........(0)	3. Hispanare (15)	4. Austrare (241)	5. Germanare (330)	6. Norgare (63)	7. Italare (16)	8. Campanare (4)	9. Lappare (7)
RANG 1........	....	....	1. Varingase (5)	1. Pantellerase (10)	1. Umptekase (23)	1. Laurdalase (26)	1. Lujavrase (9)	1. x (1)	1. Urtase (7)
Subrang 1 .	....	....	1................	1................	1................	1................	1................	1................	1 ....
Subrang 2 .	....	....	2................	2................	2. Highwoodose (3)	2. Fergusose (1)	2................	2................	2 ....
Subrang 3 .	....	....	3. Varingose (4)	3. Grorudose (6)	3. Ilmenose (6)	3. Judithose (5)	3. Janeirose (2)	3................	8. Arkansose (3)
Subrang 4 .	....	....	4. x (1)	4. Pantellerose (4)	4. Umptekose (14)	4. Laurdalose (20)	4. Lujavrose (7)	4................	4. Urtose (4)
Subrang 5 .	....	....	5................	5................	5................	5................	5................	5. x (1)	5 ....
RANG 2........	....	....	2. x (4)	2. Dacase (40)	2. Monzonase (85)	2. Essexase (22)	2. Vulturase (4)	2. Vesuvase (8)	
Subrang 1 .	....	....	1................	1................	1................	1................	1................	1......	
Subrang 2 .	....	....	2. x (1)	2. x (2)	2. Ciminose (6)	2................	2. Braccianose (2)	2. Vesuvose (2)	
Subrang 3 .	....	....	3. x (2)	3. Adamellose (19)	3. Monzonose (40)	3. Borolanose (7)	3................	3................	
Subrang 4 .	....	....	4. x (1)	4. Dacose (19)	4. Akerose (36)	4. Essexose (15)	4. Vulturose (2)	4. x (1)	
Subrang 5 .	....	....	5................	5. x (0)	5. x (3)	5................	5................	5................	
RANG 3........	....	....	3. Almerase (2)	3. Tonalase (155)	3. Andase (165)	3. Salemase (13)	3. x (3)		
Subrang 1 .	....	....	1................	1................	1................	1................	1................		
Subrang 2 .	....	....	2................	2. x (3)	2. x (1)	2. x (0)	2................		
Subrang 3 .	....	....	3. Almerose (1)	3. Harzose (26)	3. Shoshonose (45)	3. x (1)	3. x (1)		
Subrang 4 .	....	....	4. Sitkose (1)	4. Tonalose (117)	4. Andose (100)	4. Salemose (11)	4. x (2)		
Subrang 5 .	....	....	5................	5. Placerose (9)	5. Beerbachose (19)	5. x (1)	5................		
RANG 4........	....	....	4. x (3)	4. Bandase (36)	4. Hessase (54)	4. x (2)			
Subrang 1 .	....	....	1. x (1)	1. Sagamose (2)	1................	1................			
Subrang 2 .	....	....	2................	2. x (8)	2. x (2)	2................			
Subrang 3 .	....	....	3. x (2)	3. Bandose (26)	3. Hessose (52)	3. x (2)			
RANG 5........	....	....	5. Gordonase (1)	5................	5. Corsase (3)				

TABLE III.—CLASS III, SALFEMANE (304).

ORDER	1 (0)	2 (0)	3. Atlantare (2)	4. Vaalare (11)	5. Gallare (199)	6. Portugare (56)	7. Kamerunare (23)	8. Bohemare (9)	9. Finnare (4)
RANG 1			1. Rockallase (2)	1	1. Orendase (5)	1. Wyomingase (7)	1. Malignase (5)	1. Chotase (1)	1. Ijolase (4)
Subrang 1			1		1. Orendose (3)	1. Wyomingose (1)	1	1	1
Subrang 2			2. x (1)		2	2	2	2. Chotose (1)	2. Madupose (1)
Subrang 3			3		3	3. x (2)	3. x (1)	3	3
Subrang 4			4		4. x (2)	4. x (4)	4. Malignose (4)	4	4. Iiwaarose (2)
Subrang 5			5 Rockallose (1)		5	5	5	5	5. Ijolose (1)
RANG 2			2.	2	2. Kilauase (15)	2. Monchiquase (22)	2. Kamerunase (11)	2. Albanase (8)	2
Subrang 1					1	1	1	1	
Subrang 2					2. Prowersose (1)	2	2	2. Albanose (1)	
Subrang 3					3. Lamarose (3)	3. Shonkinose (8)	3. x (1)	3. x (1)	
Subrang 4					4. Kilauose (10)	4. Monchiquose (14)	4. Kamerunose (10)	4. Covose (5)	
Subrang 5					5 x (1)	5	5	5. x (1)	
RANG 3				3. Vaalase (7)	3. Camptonase (106)	3. Limburgase (20)	3. Etindase (7)		
Subrang 1				1	1	1	1		
Subrang 2				2	2. Absarokose (5)	2	2. x (1)		
Subrang 3				3	3. Kentallenose (16)	3. Ourose (2)	3		
Subrang 4				4. Vaalose (7)	4. Camptonose (64)	4. Limburgose (18)	4. Etindose (5)		
Subrang 5				5	5. Ornose (21)	5	5. x (1)		
RANG 4				4. x (4)	4. Auvergnase (62)	4. x (7)			
Subrang 1				1	1	1			
Subrang 2				2	2. x (4)	2. x (1)			
Subrang 3				3. x (4)	3. Auvergnose (58)	3. x (6)			
RANG 5				5	5 Kedabekase (11)				

TABLE IV.—CLASS IV, DOFEMANE (63).

Order	1. Hungarare (24)				
Section	1. Minnesotiare (4)	2. x (5)	3. Hungariare (9)	4. x (3)	5. Pyreniare (3)
Rang 1	1. Minnesotase (4)	1. x (5)	1. Wehrlase (9)	1. Cortlandtase (3)	1. Lherzase (3)
Section 1	1. Minnesotiase (4)	1......................	1. Wehrliase (4)	1. Cortlandtiase (2)	1. Lherziase (2)
Subrang 1	1......................	1.	1. x (0)	1. Cortlandtose (1)	1. Lherzose (1)
Subrang 2	2. Cookose (4)	2.	2. Wehrlose (4)	2. Custerose (1)	2. Argeinose (1)
Subrang 3	3......................	3.	3......................	3......................	3......................
Subrang 4	4......................	4.	4......................	4......................	4......................
Subrang 5	5......................	5.	5......................	5......................	5......................
Section 2	2......................	2 x (5)	2. x (5)	2. x (1)	2......................
Subrang 1	1.	1. Belcherose (1)	1......................	1......................	1.
Subrang 2	2.	2. x (4)	2. Rossweinose (5)	2......................	2.
Subrang 3	3.	3......................	3......................	3. x (1)	3.
Subrang 4	4.	4......................	4......................	4......................	4.
Subrang 5	5.	5......................	5......................	5......................	5.
Section 3	3......................	3......................	3......................	3......................	3. Venanziase (1)
Subrang 1	1.	1.	1.	1.	1......................
Subrang 2	2.	2.	2.	2.	2. Venanzose (1)
Subrang 3	3.	3.	3.	3.	3......................
Subrang 4	4.	4.	4.	4.	4......................
Subrang 5	5.	5.	5.	5.	5......................
Order	2. Scotare (31)				
Section	1. x (4)	2. Paoliare (11)	3. Texiare (9)	4. x (6)	5. x (1)
Rang 1	1......................	1. Paolase (11)	1. Texase (9)	1. Casselase (6)	1. x (1)
Section 1	1.	1. Valbonniase (1)	1. Marquettiase (1)	1. x (3)	1. Kalteniase (1)
Subrang 1	1.	1. Valbonnose (1)	1......................	1. x (2)	1......................
Subrang 2	2.	2......................	2. Marquettose (1)	2. x (1)	2......................
Subrang 3	3.	3......................	3......................	3......................	3. Kaltenose (1)
Subrang 4	4.	4......................	4......................	4......................	4......................
Subrang 5	5.	5......................	5......................	5......................	5......................
Section 2	2. x (1)	2. x (6)	2. Uvaldiase (8)	2. Casseliase (3)	2......................
Subrang 1	1......................	1......................	1. x (1)	1. x (1)	1.
Subrang 2	2......................	2 x (6)	2. Uvaldose (7)	2. Casselose (2)	2.
Subrang 3	3. x (1)	3......................	3......................	3......................	3.
Subrang 4	4......................	4......................	4......................	4......................	4.
Subrang 5	5......................	5......................	5......................	5......................	5.
Section 3	3. Brandbergiase (3)	3. Paoliase (4)	3......................	3......................	3......................
Subrang 1	1......................	1......................	1.	1.	1.
Subrang 2	2. Brandbergose (3)	2. Paolose (4)	2.	2.	2.
Subrang 3	3......................	3......................	3.	3.	3.
Subrang 4	4......................	4......................	4.	4.	4.
Subrang 5	5......................	5......................	5.	5.	5.

TABLE IV.—CLASS IV, DOFEMANE (63)—Continued.

Order	3. Sverigare (4)				
Section	1. Bergeniare (1)	2. x (2)	3.	4. x (1)	5. Sverigiare (0)
Rang 1	1. Bergenase (1)	1. x (2)	1.	1. x (1)	1. Tabergase (0)
Section 1	1. Bergeniase (1)	1.	1.	1.	1. Tabergiase (0)
Subrang 1	1.	1.	1.	1.	1.
Subrang 2	2.	2.	2.	2.	2.
Subrang 3	3. Bergenose (1)	3.	3.	3.	3.
Subrang 4	4.	4.	4.	4.	4.
Subrang 5	5.	5.	5.	5.	5.
Section 2	2.	2 x (1)	2.	2 x (1)	2.
Subrang 1	1.	1.	1.	1.	1.
Subrang 2	2.	2. x (1)	2.	2. x (1)	2.
Subrang 3	3.	3.	3.	3.	3.
Subrang 4	4.	4.	4.	4.	4.
Subrang 5	5.	5.	5.	5.	5.
Section 3	3.	3. Avezaciase (1)	3.	3.	3.
Subrang 1	1.	1.	1.	1.	1.
Subrang 2	2.	2.	2.	2.	2.
Subrang 3	3.	3. Avezacose (1)	3.	3.	3.
Subrang 4	4.	4.	4.	4.	4.
Subrang 5	5.	5.	5.	5.	5.

Order		4. Adirondackare (4)		
Section	Suborder	1.	2. Adirondackore (2)	3. Champlainore (2)
Rang 1		1.	1. Adirondackase (2)	1. Champlainase (2)
Section 1		1.	1. Adirondackiase (2)	1. Champlainiase (2)
Subrang 1		1.	1.	1.
Subrang 2		2.	2.	2.
Subrang 3		3.	3.	3.
Subrang 4		4.	4. x (2)	4. x (2)
Subrang 5		5.	5.	5.
Section 2		2.	2.	2.
Subrang 1				
Subrang 2				
Subrang 3				
Subrang 4				
Subrang 5				
Section 3				
Subrang 1				
Subrang 2				
Subrang 3				
Subrang 4				
Subrang 5				

Table V.—CLASS V, PERFEMANE (16).

ORDER	1. Maorare (16)				
Section	1. Caroliniare (9)	2. Marylandiare (3)	3.........(0)	4. x (2)	5. Maoriare (2)
Rang 1....................	1. Websterase (9)	1. Baltimorase (3)	1............	1. x (2)	5. Dunase (2)
Section 1	1. Mariciase (3)	1. x (1)	1.	1. x (2)	1. Duniase (2)
Subrang 1	1. Maricose.........3	1. x (1)	1.	1. x (1)	1. Dunose (2)
Subrang 2	2....................	2....................	2.	2. x (1)	2..................
Subrang 3	3....................	3....................	3.	3..........	3..................
Subrang 4	4....................	4....................	4............	4..........	4..................
Subrang 5	5....................	5....................	5............	5..........	5..................
Section 2	2. Websteriase (6)	2. Baltimoriase (2)	2............	2..........	2..................
Subrang 1	1. Websterose (3)	1. x (1)	1.	1.	1.
Subrang 2	2. Cecilose (3)	2. Baltimorose (2)	2.	2.	2.
Subrang 3	3....................	3....................	3.	3.	3.
Subrang 4	4....................	4....................	4.	4.	4.
Subrang 5	5....................	5....................	5.	5.	5.
Section 3	3....................	3....................	3............	3..........	3..................

REASONS FOR ARRANGEMENT ACCORDING TO THE QUANTITATIVE CLASSIFICATION.

The objection may be, and indeed has been, raised that the usefulness of the collection will be seriously impaired by its arrangement in accordance with a new system of classification, which, whatever be its merits or demerits, is not yet in general use. That this is true to a certain extent is undeniable, and the whole question was the subject of much thought and discussion on the part of my colleagues and myself. The decision finally arrived at was based on the following considerations:

Thoroughly believing in the general merits of the system which we proposed, we desired to have it placed before the petrographical world in the fullest manner possible. We wished to show that it is not merely an academic classification, good in its principles but not adapted to the wear and tear of everyday use, but that it is as well of real practical utility and benefit to the science. To this end we could think of no more striking means than the arrangement along its lines of the greatest possible number of the analyses represented in the collection.

Part I of the collection forms a concrete illustration of our system. In the original paper, for evident reasons, the various divisions had to be concisely defined, with few, if any, illustrations, and the magmatic names had to be given in tabular form. But here are to be found the known calculated examples of the various divisions, from a study of which the petrographer can gather their characters, chemical, normative, and modal. The new terms and the names are no longer empty syllables, suggestive of only the vaguest ideas to one who studies the system for the first time, but, illustrated as they are by the actual rocks whose characters are known, or whose descriptions can be easily referred to, become full of meaning and assume a definiteness which they would not otherwise possess.

In this collection petrographers have before them the actual mass of data by which the authors of the proposed system tested their views practically, and which was very largely used as the basis for the selection of the magmatic name roots. They are thus able to test the system at every point, see what are the practical consequences of the application of its principles, and how far the claims which have been made for it hold good.

But there was another and very weighty consideration which led to the arrangement according to the new system, and which, whether this be generally adopted or not, will render the collection much more useful than if it had been arranged along the lines of the qualitative systems.

It may be assumed that the purpose for which such a collection as this or those of Roth will be most used, will be the finding of analyses of rocks for comparison with those under investigation; and that, furthermore, as chemical analyses are to be compared, the chemical features of rocks will be the main object of search, their mineral or textural character being in such a case of subsidiary importance.

For this purpose an arrangement according to the older systems is quite inadequate, since their fundamental primary divisions are usually based on textural and qualitative mineralogical characters, and only to a minor extent on chemical characters. The consequence of this is the separation of similar analyses and the collocation of unlike ones, as will be illustrated at some length later. This renders the finding of analyses similar to any given one a matter involving much time and labor in searching through a great part of a collection arranged on such a basis.

Under the system adopted, on the contrary, the finding of analyses analogous to those under investigation is an easy matter. The norm is readily calculated by the methods given, the rock is thus classified, and the analyses in the corresponding division of the collection may be referred to. If the analysis figures out near the border in any direction, or at any point in the scheme, the divisions beyond in these directions may also be examined, and thus a good assortment of data is made available.

In the great majority of rocks which belong to the first two classes it is an easy matter, with a little experience, to judge from the analysis, even without calculation of the norm, as to the class and order to which the rock probably belongs. Then the easily ascertained ratios of alkalies to *salic* lime,[a] and of soda to potash, give the rang and subrang. If doubt exists as to the proper class or order, and it is not desired to calculate the norm, the proper rangs and subrangs indicated by the alkali-lime and soda-potash ratios may be examined. This only to find analyses similar to the one at hand. If the classification of the rock be the object in view, the calculation of the norm should never be omitted, and indeed is always the most advisable procedure.

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[a] Attention must be specially called to the fact that in the first three classes the rangs are based on the ratio between the alkalies present in the normative feldspars and lenads and the lime *in the normative anorthite only*—CaO′. The latter is equal to the difference between the sum of the (molecular) amounts of alkalies and the total alumina (molecular). The rest of the lime, CaO″, will be femic and will have nothing to do with the rangs of the first three classes. Stress is laid on this point here, as some instances have come to my notice of persons working with the new system who have not clearly understood the point, and who have determined the rang in rocks of the first three classes by the ratio of alkalies to total lime. Analogous remarks will apply to salic and femic Na_2O.

DISTRIBUTION OF ROCKS BY NEW SYSTEM.

Still another consideration which decided the present form of arrangement was that it permitted the correlation of the new with the older systems. A rather full discussion of this subject will be found on another page, but a few instances may be given here which serve to illustrate the very diverse chemical features which are embraced under almost any one of the old rock names, and conversely the number of different rock names which have been applied to rocks of any given chemical composition.

Thus, "granites" are to be found under the subrangs magdeburgose, alaskose, tehamose, alsbachose, riesenose, omeose, liparose, dellenose, toscanose, lassenose, amiatose, yellowstonose, pantellerose, adamellose, dacose, harzose, tonalose, placerose, akerose, and hessose.

"Syenites" occur in liparose, toscanose, lassenose, yellowstonose, phlegrose, nordmarkose, tuolumnose, pulaskose, laurvikose, adamellose, dacose, harzose, tonalose, highwoodose, monzonose, akerose, shoshonose, laurdalose, borolanose, lujavrose, kentallenose, camptonose.

"Trachyte" is found in liparose, kallerudose, toscanose, lassenose, amiatose, yellowstonose, phlegrose, nordmarkose, vulsinose, pulaskose, laurvikose, miaskose, viezzenose, adamellose, harzose, highwoodose, umptekose, ciminose, monzonose, akerose, shoshonose, fergusose, shonkinose.

"Diorite" occurs as toscanose, lassenose, amiatose, yellowstonose, laurvikose, sitkose, adamellose, dacose, harzose, tonalose, placerose, bandose, monzonose, akerose, shoshonose, andose, hessose, salemose, camptonose, auvergnose.

"Andesite" is met with as dellenose, toscanose, lassenose, amiatose, yellowstonose, pulaskose, laurvikose, adamellose, dacose, harzose, tonalose, placerose, bandose, umptekose, monzonose, akerose, shoshonose, andose, beerbachose, hessose, laurdalose, salemose, lamarose, kilauose, kentallenose, camptonose, and subrang 5 of albanase.

Even "camptonites" are found scattered among placerose, hessose, salemose, kentallenose, camptonose, auvergnose, shonkinose, and limburgose.

When the list for any of these is looked up in the tables of Part I, the chemical characters of the divisions of the new system into which they fall being borne in mind, the great chemical variety possibly implied by any one of the old names is most striking and indeed significant. Thus the "andesite" of different authors, though the various rocks so named may have certain textural features in common, has been applied to rocks varying chemically from persalane to salfemane, derived from magmas rich in silica (i. e., with much normative quartz) to those low in it (i. e., with much normative nephelite)—rocks varying from peralkalic to docalcic, from dopotassic to persodic. In other words, "andesite" may mean rocks having chemical compositions ranging from those of granites to those of "basic" diorites, camptonites, and gabbros. Similarly, the composition of "syenites" and "trachytes" may be that of granites, syenites, foyaites, diorites, or gabbros.

Conversely, to give only a few examples out of the many possible, the subrang nordmarkose is represented by very similar analyses of rocks described as quartz-porphyry, quartz-syenite-porphyry, syenite-porphyry, biotite-porphyrite, lestiwarite, nordmarkite, pulaskite, trachyte, bostonite, andesite, nephelite-syenite, foyaite, phonolite, tinguaite, litchfieldite, and sölvsbergite. Yellowstonose includes rocks called granite, granodiorite, adamellite, quartz-diorite, diorite, porphyry, porphyrite, syenite, dacite, andesite, trachyte; and camptonose embraces camptonite, diabase, melaphyr, basalt, gabbro, norite, essexite, andesite, phonolite, basanite, and porphyrite.

COMMENT ON FACTS EXPRESSED BY TABLES.

It is true that different names have been applied to the same or similar magmas on the basis of textural differences, but even the few instances given here, which might be multiplied indefinitely, serve to show conclusively that the chemical composition of rocks plays but an infinitesimal part in their classification according to the systems at present in use.

Many petrographers avowedly use a mineral classification as representing the chemical composition. But this is done in almost all cases in a purely qualitative way, and in apparent ignorance or neglect of the obvious fact that a mineral classification will express the chemical characters of rocks only if it is strictly quantitative. Otherwise, of course, the chemical character will be almost wholly lost sight of in the majority of instances, or at least will not be indicated with any approach to certainty or completeness.

These considerations, and the correlation given elsewhere, constitute, in reality, a reductio ad absurdum of existing classifications, if these make any pretense at being founded on the chemical or the quantitative mineralogical characters of igneous rocks. When two rocks of the same chemical composition can be called, the one a granite, the other a diorite, or when one name is applied to rocks varying chemically to the extent implied usually by these names, it seems time that something be done to define our terms and to replace the vague rock names and definitions at present in use by some which have more precise and clearly defined limits and meanings.

While, in general, the chemical similarity of the analyses embraced in any given subrang is very evident, yet the critical student will find instances here and there of analyses in the same subrang which vary considerably from one another as regards certain constituents, or which vary more from others in the same subrang than they do from analyses elsewhere. This is especially noticeable in regard to the silica percentage, which may vary as much as 10 per cent of the whole rock in a given subrang. Alumina may also vary considerably—to the extent of 5 or 6 per cent—and the other constituents also, but generally to a less extent.

Some of these cases of apparent contradiction to one of our fundamental principles are due to the fact that the analyses of some rocks which are not quite fresh have been included in Part I for various reasons. The amount of water and carbonic acid present will, of course, diminish the amounts of the other constituents, this diminution affecting most the silica and alumina, which are present in greatest amount. A few cases are also due to the nondetermination of TiO_2, the nonseparation of the oxides of iron, or a high amount of ferric oxide owing to alteration of the rock. These will affect the amount of available silica in calculating the norm, yielding results which vary somewhat widely from the center point.

But the majority of the apparent exceptions have broader explanations than these, and will be seen to be quite conformable with our premises. It must be remembered that this classification of rocks, like any other, allows for some variation from the center point of each division in different directions. This may affect any of the constituents, but will be most evident in those which are present in greatest amount, as silica and alumina. In the nature of the case such variation is unavoidable, and when chemical similarity is spoken of it is understood that the similarity lies within the limits assigned, conformable to the center point and to the boundaries of the division. A study of the tables of calculated center points, given later, will be of interest in this connection.

The fact that an analysis may resemble more closely one in another division than others in its own is, of course, due to the arbitrary character of the classification. As was said in the paper describing this system,[a] "Unless the future should reveal new properties of rocks . . . every method so far devised, or which can be devised, must have artificial lines of division." And again, "The difficulty in this respect lies not in the method, but is inherent in the subject itself."

It must also be borne in mind that in the proposed system of classification the position of any given rock depends on the mutual relations of all the constituents, and not on the absolute amount of only one or two, as is so often the case in the qualitative classifications. It will thus happen often that while one of the constituents may seem to vary somewhat widely from the average of the analyses in the same division, yet if the analysis is considered with respect to all the constituents, the similarity will be manifest. The position of two rocks, for instance, will not depend (given similar mineral composition) on the fact that the silica in one is 5 or 10 per cent higher than in the other, but in each case on the relations of this constituent to all the others and the mutual relations of each of these to the rest, which will determine the norms in the two cases, and hence determine whether the two rocks are chemically alike in all respects or not. Here, also, the tables of center points will repay some study.

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[a] Loc. cit., pp. 232, 687.

This being so, the apparent instances of contradiction to our principle of bringing together rocks chemically similar are seen to be unavoidable, and, falling as they do within the limits prescribed, they are not exceptions and can not be brought up as objections against this particular system more than against any other.

The classification has not been carried further than subrang in any case. This was as far as was deemed advisable, since for Classes I and V the division into grads and subgrads is impracticable, and in Classes II and IV, and often in III, the subrang is the lowest division needful for most purposes of reference. Further subdivision would also have increased considerably the complexity of the tables, and, in view of the novelty of the classification, it was thought best to avoid this.

VARIOUS FEATURES OF THE TABLES.

Geographical arrangement.—In each of the subrangs the arrangement is geographical. The primary step is by continents, North and South America coming first, then Europe, Africa, Asia, Oceania, and Australia. Further arrangement in each continent is possible on several plans. While an alphabetical one, by States, has certain advantages, it was finally decided that it should be, in a way, zonal, and thus express roughly certain broad petrographical provinces, these zones being then further subdivided according to political divisions in definite directions. Thus North America may be referred to four zones, running north and south: An Atlantic zone, embracing the territory from Greenland, through Quebec and the Eastern Provinces of Canada, the Eastern and Middle States, and the Southern States to Alabama; a Central zone, from Ontario southward, through Michigan, Minnesota, Missouri, etc., to Texas; a Rocky Mountain zone, including the States from the Dakotas and Montana south to New Mexico; and a Pacific zone, from Alaska, through British Columbia and the Pacific coast States, to Mexico and Central America. Similarly, Europe is divided into a Western zone, including Iceland, Great Britain, Belgium, France, Portugal, and Spain; a Central zone, including Norway, Sweden, Finland, Germany, Austria, Hungary, Switzerland, and Italy; and an Eastern zone, embracing Russia (except Finland), the Balkan Peninsula, Greece, and the Archipelago, with, generally, the Caucasus and Asia Minor.

That this arrangement is open to criticism is undeniable. But it must be remembered that it is only a matter of convenience for use here, with no implications as to petrological generalizations concerning the distribution of petrographical provinces. The aim has been merely to facilitate reference, and, as far as possible, to keep rocks of near-by localities together.

The arrangement in each country or State is by localities; these, like the States, being arranged in a general order from north to south (in Germany from west to east). In rocks from the same locality the final arrangement is by the silica content, those highest in this coming first.

Numbering of analyses.—For purposes of reference each analysis is numbered, the numbering beginning anew with each subrang. Thus an analysis will be referred to as No. 26, liparose, or No. 17, camptonose, etc. If the subrang is as yet unnamed it may be referred to, e. g., as No. 3, SR 5 of monzonase, etc.

Rating of analyses.—With the number is also given the rating assigned it by me, on the basis already described. The symbols to indicate the elements of accuracy and completeness are given, as well as its rating, concisely expressed by Roman numerals. Thus, A1, I means that the analysis in question is excellent or first rate, being as accurate and as complete as possible, A3, III that it is fair, or third rate, it being excellent as to accuracy but only moderate as to completeness.

It may be remarked that in the assignment of the ratings I have endeavored to be as unprejudiced as possible. When there seemed to be any doubt it has always been settled in favor of the analyst, and there are many analyses which are here rated as superior ones which I look on with suspicion, though without positive proof of their inferiority. In a certain way this may not be exactly just to the science as a whole, but, in view of the fact that this is the first attempt that has been made to deal critically with such a large mass of analytical data, it was thought best not to be hypercritical.

It has been impossible in most cases to indicate the grounds for the ratings assigned, though generally they are sufficiently obvious to one acquainted with the chemical analysis of rocks and the proper correlation of the mode with the chemical composition. In regard to this I can only say that each individual analysis has been the object of careful consideration, and that the ratings have been revised several times, till I am now quite confident of their correctness in nearly all cases.

Results of rating analyses.—In connection with this subject, and in justification of the adverse criticism which has been made in the preceding pages, it will be of interest to give a concise statement of the relative numbers of analyses of the various ratings as revealed by the collection. They will be found tabulated according to ratings in the accompanying table:

Rating.	Part I.	Part II.	Whole collection.	Per cent of whole.
I.......	492	38	530	18.40
II.......	530	42	572	19.85
III.......	694	68	762	26.45
IV.......	168	258	426	14.79
V.......	13	578	591	20.51
	1,897	984	2,881	100.00

It will be seen that while there is no very great difference in relative numbers, yet that analyses of the third rate are somewhat more numerous than any others—that is, in general, those analyses in which only the nine main constituents have been well determined, and not TiO_2, P_2O_5, etc. Next to these come the positively bad ones, closely followed by the good and excellent ones, with the poor analyses in smallest amount.

The superior analyses, those of the first three ratings, constitute 64.70 per cent of all, and the inferior 35.30 per cent. In other words, more than a third of all the analyses which have been made in the seventeen years included by the collection are not worthy of use for general purposes, and a very large part of them are useful for no purpose at all. The labor expended on these 1,017 analyses has been almost entirely thrown away, if nothing more severe be said.

These figures are sufficient to show that the standard of criticism with regard to the making and use of rock analyses is, or has been, far too low, and the showing can scarcely be called very creditable to the science. They at least justify the calling of the attention of petrographers to the state of affairs and to the urgent need of reform.

It will be noted that the excellent and good analyses together amount to 1,102, or 38.25 per cent of the whole. Of these, the chemists of the United States Geological Survey have made 655, or nearly 60 per cent, while of the 492 excellent ones alone they have made 437, or 88.82 per cent, figures which reveal clearly the preeminent position they hold in this branch of the science.[a]

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[a] Of the 655 analyses of igneous rocks (including tuffs) given in Bulletin 168, 437 are excellent, 218 good, 72 fair, 8 poor, and 1 bad. Of these the fair ones were nearly all made in the early days of the laboratory, while the poor and bad ones are thus rated on account of the nonseparation of alumina and iron oxides, 7 of them being of volcanic dust or sand As to accuracy nearly all are rated A. It is gratifying to note that the analyses that are now being made by the New South Wales Geological Survey are of almost equally high standard.

Constituents.—The chief constituents are given in horizontal rows on the left. This is the method employed by Roth, and it was adopted here, rather than an arrangement in vertical columns, because it facilitates reference and for typographical reasons. With these chief constituents are included TiO_2, P_2O_5, and MnO, since these are in general the most important of the minor constituents, and the two former are present in all excellent and good analyses, and in many that are rated fair. BaO is also placed here, because it is so frequently determined in the analyses of the United States Geological Survey, and to save space elsewhere.

In analyses in which the iron oxides are not separately determined, the figures are given under Fe_2O_3 or FeO, according to the statement of the original analysis. When, however, there is no indication as to this point in the original, the two oxides being connected by a bracket, I have assumed that they really represent Fe_2O_3, as this is the form in which they are weighed, and have so placed them. This may not always correspond with the facts, but their nonseparation greatly lessens the value of the analysis, and this seemed the most reasonable assumption to make in order to calculate the norm, so that this has been uniformly followed in the absence of information to the contrary.

When they are so stated in the analysis, combined and hygroscopic water are both given, but no attempt has been made to discriminate between the various temperatures at which the hygroscopic water has been determined. Usually this is 110°, but often 100° or 105°, and occasionally 120° or 130°. The difference in the result is so small and of such slight importance that indication of the exact temperature seemed to be not worth while.

No indication is given also as to whether the water has been determined directly or as loss on ignition. This is a defect in the collection which is greatly regretted, and which would have been corrected were time and opportunity at my disposal. It arose from the fact that a very considerable number of analyses had been collected before publication was decided on, and in these the discrimination had not been made. As a matter of uniformity the same course was adopted in the analyses collected subsequently. It may also be remarked that in the majority of analyses no hint is afforded in the statement as to how the water was determined, so that, even if special attention had been paid to this point, decision would have been impossible in very many cases.

The molecular ratios of the main constituents are given below the percentage figures. In calculating these Professor Kemp's tables[a] were of inestimable assistance. The molecular weight of TiO_2 was, however, taken as 80, instead of 82, given by him. Where the iron oxides have not been separated and are given as Fe_2O_3 only, the molecular ratio of this is given, and under FeO the equivalent of this reckoned as

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[a] Kemp, J. F., School of Mines Quarterly, Vol. XXII, p. 82.

FeO, in brackets, which has been used in calculating the norm. In cases where the alkalies are in excess of Al_2O_3—that is, where normative acmite is present—the appropriate molecular amount of Fe_2O_3 is given under this head, and the rest calculated as FeO. It may be noted that the molecular amount of FeO equivalent to Fe_2O_3 is obtained by doubling that of the latter.

The minor constituents, except TiO_2, P_2O_5, MnO, and BaO, are placed in the column headed "Inclusive," their molecular ratios being omitted. The order in which these are given is that suggested a few years ago.[a]

In the course of checking the summations a number of errors in the original figures have been detected. In this case the correct summation is placed above, and that given in the original paper is placed below in parentheses.

Specific gravity.—The specific gravity of the rock is given in every case where it could be ascertained from the original paper. The temperature at which it was determined is stated in centigrade degrees.

Norm.—The norm—i. e., the composition expressed in terms of the "standard minerals"—is given for each analysis included in Part I of the collection, embracing those classified by the new system, but is omitted for those which are found in Part II. Norms could, of course, be calculated for these, but the poor quality of the analyses would have rendered them of no value, if not positively misleading. They have been calculated uniformly according to the method prescribed in our joint paper, and great care has been exercised to insure correctness, as upon the norm depends the position of the rock in the system. The whole collection has been examined a number of times, and many of my results have been collated with those of Professor Iddings, who has also calculated the norms of a great number of analyses. It is therefore hoped that few serious errors will be found, though it can scarcely be expected that they are wholly absent.

In correcting the proof sheets one error was detected in the classificatory position of a rock, to which attention may be called here. It was due to inadvertence, as the norm is correctly calculated. The rock is No. 25 of miaskose (p. 211), which should be No. 2a of viezzenose (p. 212).

It will be found in many cases that recalculation of the norms will not furnish results absolutely identical with mine. This is not due to lack of uniformity in the methods, but partially to my having often neglected, as unimportant and to save time, small amounts of minor constituents, especially P_2O_5, Cl, MnO, and BaO. Slight discrepancies may also be met with here and there in the amounts of some of the femic minerals, such as the pyroxenes, diopside, and hypersthene, and olivine. This is due to the fact that the FeO and MgO have not always been distributed among these in exactly the same ratios, as should be done in the precise application of our methods of calculation,[a] but only approximately so, to save time. It will, however, seldom occur that either of these slight inaccuracies will be found to affect the position of the rock in the system. If they should, the rock, in any case, would lie near the border of the other division, and hence be transitional in character.

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[a] Washington, H. S., Am. Jour. Sci., Vol. X, 1900, p. 59.

In stating the norm, the standard minerals are referred to by the symbols which we have adopted for them, a list of which will be found in the table of abbreviations.

Correspondence of norm and mode.—In connection with this matter attention may be called to the general close correspondence of norm and mode, which has already been briefly discussed by us.[b] If the norms are carefully considered in connection with the descriptions it will be found that the agreement is very close in a large proportion of cases, especially in the persalanes, most of the dosalanes, and the perfemanes. Allowance must, of course, be made for certain peculiarities of the norm. Thus, in mica-bearing granites, as muscovite is not included among the standard minerals, and as biotite is alferric, these minerals appear as normative corundum and orthoclase, or orthoclase and hypersthene, respectively, being measurable by the amount of normative corundum present. Similarly modal pyroxene and augite, and much modal hornblende appears in the norm as diopside and hypersthene, but, as will be known to anyone who has done much in calculating modes, this is practically the form in which they would be calculated generally in determining the actual mineral composition, unless it were desired to do it with the greatest nicety, and allowance were made for the aluminous molecules, the correction for which, as we have shown, is not of much moment in most cases. Of course, in the salfemanes and dofemanes the divergencies are more considerable, but the general agreement in the majority of rocks is so satisfactory as to be a sufficient answer to some of the objections which have been raised to the use of a theoretical norm.

Locality.—The locality names are those given by the author in each case, though space considerations necessitated the omission of the more precise details, such as distances in general, quarry names, etc. If these are desired, reference must be made to the original paper.

The country name is omitted in cases where the State, province, or district is given and is well known, though it is inserted when the locality is small or little known, and when the province, etc., is not furnished by the original paper. The endeavor has, however, been made to look up all doubtful localities, so as to determine the province, etc. The names of countries, provinces, and the larger places are given in their anglicised forms, and in general the Century Atlas (New York, 1901) has been followed. The locality index will, however, contain cross references to the native names (as, e. g., Oesterreich cf. Austria), so that this will not be a serious difficulty to those who do not know the English equivalents.

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[a] Cross, Iddings, Pirsson, Washington, Quantitative Classification, p. 646.

[b] Cross, Iddings, Pirsson, Washington, op. cit., p. 151. The statement made there that the analyses in the collection amounted to over 3,000 was due to an error in including the cards of the analyses of serpentines and metamorphic rocks which had been collected.

Analyst.—The name of the analyst precedes that of the author of the paper, since this is a collection of analyses, and because the analyst is one of the factors often of use in rating analyses. When known, the initials of the Christian names are inserted, but, as these are sometimes not given by the author, and are unknown to me, they are perforce omitted in some cases. In other cases the name of the analyst is quite disregarded by the author, when I have had to rest content with the phrase "not stated."

Reference.—The aim has been, in the column headed "Reference," to indicate the author by whom and the place where the analysis in question was published for the first time. Subsequent publications, whether by the same author or by others, have been disregarded as a rule. It happens, however, that many analyses made for authors who are connected with Government surveys, notably that of the United States, have been first published in papers appearing in unofficial journals, society proceedings, etc., and only subsequently in official reports, bulletins, etc., of the survey. In such cases there is given in the column headed "Reference" the place of the first (unofficial) publication, while under "Remarks" is noted the place of the first official publication. This seems just to the Survey, since the analyses were made by official chemists.

In general, such publications as "Reports of work done," etc., even though official, in which the analysis appears without any description of the rock, are neglected, unless this is the only reference available. In the case of analyses made by the chemists of the United States Geological Survey, and published in unofficial journals, etc., but not in the official publications prior to 1901, only the first reference is given, and not that to Bulletins 148 or 168 of that Survey, in which they may appear. Reference to either of these two bulletins indicates that this is, so far, the only place where the analysis may be found, except as one cited from them. The author in this case is the petrographer who has furnished the description for the bulletin.

It must be noted that the page number given in the reference is always that on which the analysis occurs, not that on which the paper commences. The date given is that of the year of publication, not that of the year for which the report, etc., is issued. It must also be mentioned that there were found in the volumes of the Neues Jahrbuch a number of analyses, given in the Referate, which have been published in papers inaccessible to me, and which would, therefore, otherwise have escaped incorporation in the collection. In such cases the original reference is not given, as the page on which the analysis appears is never mentioned in this part of the Jahrbuch. I give only the name of the author, with the reference to the Neues Jahrbuch. I have, unfortunately, been obliged to omit some analyses that have appeared in journals published in languages with which I am totally unacquainted, notably Russian, Bohemian, and Hungarian, when the impossibility of understanding the context left me in absolute ignorance as to the occurrence or character of the rock.

The names of journals, etc., are given in abbreviated forms, which have been made as concise as seemed consistent with proper clearness, and it has been an aim to establish some standard forms of abbreviation for the use of petrographers. In this I have been aided by, and have partially followed, the lists in Dana's System of Mineralogy (1892) and the Geologisches Centralblatt (I, 1901), though I have modified their abbreviations in many particulars, chiefly in the direction of still further condensation. A list of those adopted will be found on another page.

Author's name.—Under this caption is found the name of the rock as given by the author in the paper cited. A few minor changes have been made, notably the replacement of eleolite or nepheline by nephelite, and the occasional shortening of some names composed of those of several minerals, as pyroxene-andesite for hypersthene-augite-andesite, etc. In a few cases the name given the same rock by others is given either here or in the last column.

Remarks.—In the column headed "Remarks" will be found additional information for which there is no place elsewhere in the tables, or attention is here called to certain features of the analysis of the rock. Thus, if it is known, or if the analysis indicates, that the rock analyzed was not fresh, this fact will be stated here. If the analysis falls near the border of another division than that to which it is assigned, this other will usually be given. Attention will also be called to unusually low or high summations, or to those features of the analysis which there seems to be reason to regard with suspicion. This information is of necessity stated very concisely, and in many cases omitted, since any discussion is out of the question in the small space available.

It was desired to insert here short notes on the mode (actual mineral composition) and the texture, etc., of each rock, as was done by Roth. It was found, however, that this would not only greatly enlarge the tables, but would consume a great deal of time. The descriptions of most rocks are so lengthy, and so few papers have any summary of the mineral and textural features of the rocks described, that the attempt to give a concise description would have involved a pretty careful reading and consideration of each paper. So, after considerable data had been collected along this line, the idea was ultimately abandoned.

CORRELATION OF THE QUANTITATIVE AND THE QUALITATIVE SYSTEMS.

Since the present collection embraces a very large mass of data concerning igneous rocks which have been published in recent years, either given in the analyses or accessible through the references, it has been thought that this presents a good opportunity to discuss briefly the correlation of the quantitative system proposed by us with the older qualitative ones. While this can be worked out from the tables by anyone, yet the proceeding would be laborious, and as the author has had many of the prominent features called to his attention during the course of compilation and arrangement, it will be useful to point out some of these to others, and to indicate in a general way the relations of the new and the old systems. This discussion, it may be premised, must be but sketchy at best, as full treatment of many of the points which present themselves would lead us too far.

Before taking up the subject, however, several features in which the two systems differ must be mentioned, which must be constantly borne in mind in the discussion of the matter.

One of these is that the new system introduces some concepts that are quite distinct from any which have received formal recognition in the older systems. Among these is the primary division into classes according to the relative amounts of salic and femic minerals. This, of course, has certain analogies with Brögger's idea of leucocratic and melanocratic rocks, but, based as it is on the idea of normative standard minerals, it is in reality quite distinct. Another is the idea of contrasting, e. g., the feldspars with quartz and the lenads (feldspathoids), which consequently groups together in one order many of the older syenites and anorthosites.

Another point of difference is the greater precision of definition and narrowness of limits of the various divisions, which results, on the one hand, in a distribution of the older terms over many of the new divisions, and, on the other, in the collocation in one of the new divisions of several of the older rocks.

A third point is the fact that the new system takes no cognizance of the texture or the mode of rocks in its magmatic divisions and names, which are all that concern us here, or at least all that can be discussed. To study the possible textural and modal phases of any of the new magmatic divisions in detail one must look up the various references given in the tables, although of course some of these will be involved or implied in the subsequent discussion.

Bearing these as well as the other known differences in mind, we may take up the examination of the two systems from a comparative point of view. It will be convenient to do this from two sides to see, first, where some of the most important rock families and groups of the older systems fall in the new, and second, what of the older rock groups some of the more prominent divisions of the new system may contain. In general the arrangement of Zirkel will be followed in preference to that of Rosenbusch, since, in the former, texture is considered of less importance than mineral composition.

FROM THE QUALITATIVE POINT OF VIEW.

The granites, quartz- and granite-porphyries, aplites, and rhyolites are widely scattered, since in the older systems little or no attention was paid to the relative amounts of quartz and feldspars or to the alkali ratios in general. They fall mostly in persalane, in the orders columbare and britannare. In the former they occur in all the rangs represented, from the peralkalic alaskase to the alkalicalcic riesenase, without distinction of the alkalies. In britannare they are abundant in the peralkalic order liparase, as well as in the domalkalic toscanase, and a few in the alkalicalcic coloradase. Some are also met with in the order austrare of dosalane, especially in the domalkalic rang dacase, but none occur in the salfemane class. To specify a few particular types, paisanite, comendite, quartz-lindoite, the typical bostonite of Marblehead Neck, and one grorudite are found in liparose, while the alaskites of Spurr fall in alaskose, liparose, and lassenose. The most acid of Brögger's grorudites are found in varingose of hispanare, while others occur in grorudose and pantellerose of austrare, where also the pantellerites fall for the most part. Alaskose, liparose, and, to a less extent, toscanose, may be regarded as the divisions containing the most typical of these rocks, irrespective of texture.

Syenites, syenite-porphyries, and trachytes do not seem to have quite such a wide range as the granites, etc., though they appear unexpectedly in a number of places. They are most abundant in the peralkalic and domalkalic rangs nordmarkase and pulaskase of canadare in persalane, as well as to a less extent in the domalkalic rang monzonase of germanare in dosalane. Although they are considered to contain orthoclase as the predominant feldspar, only a few are dopotassic, the most prominent of these being vulsinite and ciminite, which fall respectively in pulaskase and monzonase. The great majority are either sodipotassic or dosodic. The well-known trachytes of the Phlegrean Fields and Ischia fall in the sodipotassic phlegrose, while the pulaskite of Arkansas, with other syenites of the Eastern United States, fall in pulaskose. The most typical of Brögger's nordmarkites, with the greater part of the sölvsbergites and acmite-trachytes, occur in the dosodic nordmarkose. The typical laurvikites of Brögger, with many of the rhomben-porphyries, occur in laurvikose, while most of his akerites are to be met with in the dosodic akerose of monzonase. Phlegrose, nordmarkose, and pulaskose may be regarded as the places for the typical syenites and trachytes.

The monzonites, as defined by Brögger, especially those of the Tyrol and of Montana, together with some of Ransome's latites, and the ciminites, which were all recognized as intermediate between syenites and diorites, fall for the most part in monzonase, the domalkalic rang of germanare in dosalane. Here also are found the gauteite of Hibsch, and many of Iddings's banakites. Most of the shoshonites occur in shoshonose, the sodipotassic subrang of andase, while the absarokites belong almost equally to the dopotassic absarokose or the sodipotassic kentallenose, subrangs of camptonase, the alkalicalcic rang of gallare in salfemane.

Of the nephelite-syenites, phonolites, and tinguaites, the great majority belong either in the peralkalic rang miaskase of russare in persalane or in the corresponding laurdalase of norgare in dosalane. A few are met with in nordmarkose and in laurvikose, as well as in the domalkalic rang viezzenase of russare. For the greater part they are dosodic, either in miaskose, which may be considered their typical position, or in laurdalose, the latter including the laurdalites of Brögger. The lujavrites contain more nephelite and femic minerals than the majority of the nephelite-syenites, and are nearly all in lujavrase, the peralkalic rang of italare, this lenfelic order belonging to dosalane.

There are few superior analyses of the leucite-trachytes and leucite-phonolites, but all of these are to be found in domalkalic rangs, for the most part in the dopotassic subrangs vulsinose and ciminose, and the sodipotassic beemerose.

The diorites and their porphyries are pretty well distributed through the less alkalic rangs of britannare in persalane and austrare and germanare in dosalane. There are only a few to be found in the salfemane class, this being due to the fact that the abundant hornblende and biotite contain much normative feldspar, which throws most of these rocks with about equal amounts of feldspars and dark alferric minerals in the dosalane class. Quartz-diorites and granodiorites occur in the alkalicalcic rang coloradase of britannare, the domalkalic dacase, and the alkalicalcic tonalase of austrare, some of them being sodipotassic in adamellose and harzose, while still more, of course, are in the dosodic yellowstonose, dacose, and tonalose. The dacites, while fewer in number, are quite widely scattered, many of them falling in lassenose, amiatose, yellowstonose, dacose, and tonalose. The diorites proper also are very divergent, but are most numerous in yellowstonose, tonalose, monzonose, akerose, shoshonose, and andose. The andesites seem in general to carry more normative quartz than the diorites, and are found mostly in amiatose, yellowstonose, tonalose, and andose, as well as in many other divisions. There does not seem to be so large a proportion of sodipotassic andesites as of diorites. The majority of the typical camptonites belong to camptonose, in the order gallare of salfemane. They are thus more "basic" than most diorites, though some of these also fall in gallare.

With the gabbros, norites, diabases, and basalts we leave almost entirely the persalane class, an overwhelming proportion of these falling in dosalane and salfemane. These rocks belong almost entirely to the perfelic orders germanare and gallare, more particularly in the alkalicalcic rangs shoshonase and camptonase, and still more abundantly in the docalcic hessase and auvergnase. Hessose and auvergnose may be regarded as the most representative divisions for these rocks. The anorthosites fall, of course, in the perfelic order canadare of persalane, most of them being in the docalcic labradorase and only a few in the percalcic canadase.

The most typical theralites and essexites fall together in essexose, and are thus lendofelic and dosalic. The majority of the monchiquites, however, are salfemic, though also lendofelic and domalkalic, and are to be found mostly in monchiquose, though a few occur elsewhere.

Of the nephelite- and leucite-basalts, tephrites and basanites, leucitites and nephelinites, there are comparatively few superior analyses, but most of them are found in italare and campanare of dosalane and in portugare, kamerunare, and bohemare of salfemane, while a few are in the dofemane class. They are all either domalkalic or alkalicalcic, but the analyses are so few and so scattered that it seems scarcely worth while giving the rangs and subrangs where they occur. The ijolites fall in ijolase of finnare (salfemane), and the urtites in urtase of lappare (dosalane).

The few analyses of limburgites and augitites are somewhat scattered, but the most typical belong to the dosodic limburgose, in the alkalicalcic limburgase. They are thus seen to contain considerable normative nephelite subordinate to feldspar (portugare), and with equal amounts of salic and femic minerals (salfemane).

The position of the melilite-basalts and alnoites is somewhat uncertain, owing to the paucity of analyses and the decomposed condition of all the alnoites analyzed as yet. Those analyses which can be used place these rocks, for the most part, in the dofemanes, and more particularly in the suborders paoliare and texiare of scotare, and in domiric rangs of these.

Coming to the peridotites and pyroxenites, it is seen that so few analyses of these are available that are either good or made on fresh material that any correlation must be unsatisfactory. It is evident that rocks belonging to these groups have been comparatively little investigated, partly on account of their greater rarity and partly on account of their generally decomposed condition. It is also clear that they have been, so far, differentiated or discriminated between as to important differences only to a very small extent in previous classifications, many rocks of varying composition and character being grouped together under one name. This, of course, is a consequence of the importance assigned to the feldspars, as well as of the nonrecognition of the logical principle that any constituent should have weight in classification in proportion to the amount present in any case.

It will therefore be useful here only to give a few instances of the positions of older, very femic, rock types in the new system. The dunites fall in the permagnesic dunose, in the perolic section maoriare of the perpolic maorare in perfemane. Websterite and a few other such pure pyroxenites are found in websterose and cecilose of the perpyric section caroliniare of the same order, maorare. Other groups, as wehrlite, lherzolite, saxonite, peridotite, picrite, etc., are represented by so few usable analyses, and these so scattered, that their correlation here is not advisable. Much more work must be done on all these rocks before they can be properly classified.

FROM THE QUANTITATIVE POINT OF VIEW.

The correlation from the point of view of the new quantitative system will involve some repetition of what has been given above, and we may confine it to the more important divisions and give only some of the more interesting and better known rocks which fall in each. Beginning with persalane, no analyses of victorare are as yet known, but this order is represented by quartz veins of igneous origin. The belgares are represented by only a few rocks, for the most part highly acid porphyries and rhyolites, with two dacites and the Grainsgill greisen of Harker. The columbares are represented by granites, granitites, porphyries, aplites, rhyolites, and liparites, there being in the present systems, as a general rule, no distinction made among those that fall here in regard to the proportions of alkalies to lime or soda to potash. The britannares likewise embrace rocks called by the same names, but granodiorites, quartz-diorites, dacites, and andesites begin to appear sporadically in the domalkalic and alkalicalcic rangs. The domalkalic toscanase contains the more clearly defined dellenites (in dellenose) and toscanites (in toscanose). There are a few cases of distinct names bestowed on certain rocks on account of the presence of peculiar dark minerals, though in very small amount, as with paisanite and comendite, whose analyses differ in no respect from those of other rocks, such as granites, porphyries, and rhyolites, which have not been so distinguished. This is an excellent illustration of the prevailing habit of giving a distinct name if an unusual mineral is present, even in small amount, while quantitative distinctions of much greater real importance are ignored.

The canadares are represented by a considerable assortment of highly feldspathic rocks, ranging from true syenites and trachytes, with only alkali feldspars present, to the anorthosites. Of the rocks that belong in the peralkalic nordmarkase, there are none known that are either perpotassic or dopotassic, the majority being either sodipotassic or dosodic, the latter subrang (nordmarkose) containing litchfieldite, nordmarkite, and sölvsbergite. Two of the persodic tuolumnoses have been called soda-syenite by Becker and by Turner. The domalkalic rang pulaskase includes, in its dopotassic subrang vulsinose, the vulsinites of Italy described by me, with a chemically equivalent, but modally different, leucite-trachyte, as well as the peculiar leucite-granite-porphyry described by Hussak, in which, however, the primary nature of the quartz is somewhat doubtful. The sodipotassic pulaskose is represented by the pulaskite of Arkansas, with other syenites and trachytes, and an andesite or two. The dosodic laurvikose contains laurvikites, and rhomben-porphyries, with a tönsbergite, and some syenites, trachytes, and andesites. A number of the rocks which fall in nordmarkase and pulaskase carry small amounts of nephelite, so that they have been called nephelite-syenites, but not enough, according to the classification proposed, to place them in the order russare. The docalcic labradorase is represented by anorthosites and "labradorite rocks" of Minnesota, Canada, Norway, and Russia, while the percalcic canadase contains a few anorthosites from Maine and Ontario.

The lendofelic order russare contains many nephelite-syenites, with phonolites and tinguaites. They are mostly peralkalic, belonging to miaskase. The sodipotassic subrang of this, beemerose, includes some leucite-phonolites and leucite-tinguaites, which are chemically identical with, but modally distinct from, the nephelite-syenites also belonging here. The persodic mariupolose is represented by the mariupolite recently described by Morozewicz. The domalkalic viezzenase contains only a few rocks, of which the most important is the nephelite-porphyry of Viezzenathal, Predazzo, with some nephelite-syenites and tinguaites rather low in silica. To tasmanare, in which the feldspars and feldspathoids are present in equal amount, there belong only three nephelite-syenites and nephelite-porphyries. Of rocks belonging to the last two orders of persalane, that is, rocks composed dominantly or entirely of nephelite or leucite, there are no analyses.

The corundum-bearing subclasses of persalane are represented by only seven analyses. Two of these belonging to the second subclass (with quartz, feldspar, and feldspathoid dominant over corundum) are of the perfelic order indare, so named from the corundum-syenites of India, though unfortunately no analyses of these are available. The only two rocks which are known to belong here are a corundum-syenite and a corundum-pegmatite from the Urals, described by Morozewicz. In the third subclass, with corundum equal in amount to the other salic minerals, we find the kyschtymites of Morozewicz, which are perfelic (order siberare) and either docalcic or percalcic.

In the dosalane class, which is the most largely represented of all, we find no rocks which belong in the first two orders, though rockallite (in salfemane) falls nearly in order 2. In hispanare there are only a few rocks, most of them in the peralkalic rang varingase, to which belong the grorudite of Varingskollen and a pantellerite of Khagiar. In almerose is found the cordierite-andesite of Cabo de Gata.

The order austrare, with feldspar dominant over quartz, is a large and important one. The peralkalic rang pantellerase includes, in the sodipotassic grorudose, the typical grorudite of Grussletten and one or two pantellerites, and in the dosodic pantellerose other pantellerites. The domalkalic dacase contains syenites, rhyolites, quartz-diorites, porphyrites, andesites, and dacites. The alkalicalcic rang tonalase embraces quartz-diorites and tonalites, granodiorites, diorites, monzonites, andesites, latites, and dacites. Its dosodic subrang tonalose is of especial interest, as there fall here the average igneous rock of the globe and of the United States, as calculated by Clarke, and that of Great Britain, as calculated by Harker. The docalcic bandase is is not very largely represented, some quartz-diorites, diorites, andesites, and basalts falling here, among them andesites of Japan, a quartz-basalt of Lassen Peak, and some Maryland diorites.

The perfelic order germanare embraces a very wide range of rocks under the qualitative systems. The peralkalic umptekase contains the umptekite of Kola, with, among other things, a hedrumite and a heumite of Brögger, the so-called nephelite-syenite of Red Hill and the umptekite of Beverly, Mass., with two sölvsbergites.

The domalkalic monzonase has in its dopotassic subrang ciminose the ciminites of Viterbo, with a chemically equivalent leucite-trachyte, the "mica-trachyte" of Monte Catini, and the durbachite described by Sauer. The sodipotassic subrang monzonose is represented by the monzonites of Predazzo and Monzoni, as well as those of Yogo Peak (yogoite) and Beaver Creek, Montana, most of the banakites of Iddings, some of the Californian latites of Ransome, mica-basalts from Arizona, the gauteite of Hibsch, the Arso olivine-trachyte, and many porphyrites, syenites, etc., with a few kersantites. The dosodic akerose contains some of Brögger's akerites, with the soda minette of Brathagen, the verite of Osann, and many syenites, porphyrites, andesites, etc., as well as five "segregations in granite" from Mount Ascutney.

The alkalicalcic rang andase is a large one, embracing many diorites, andesites, gabbros, basalts, etc. The augite minette of the Plauensche Grund is the only rock found in its dopotassic subrang. The majority of Iddings's shoshonites fall in the sodipotassic shoshonose, with some leucite-banakites, and here also belong some of the latites of California, a few kersantites, and one of Pfohl's analyses of the Rongstock essexite. To the dosodic andose, which is chiefly made up of diorites and andesites, belong the quartz basalts of Rio Grande Canyon, New Mexico, and those of the Cinder Cone in California. The persodic beerbachose is named from the beerbachite of the Odenwald, and includes also some diorites, gabbros, basalts, etc., with a luciite porphyry of Chelius. The docalcic hessase embraces principally gabbros, diabases, and basalts, with the typical luciite of Chelius. The percalcic corsase is named after the corsite from Corsica, though no good analysis of this is known. The only rocks actually found here are a diorite of Maryland and two gabbros.

The lendofelic order norgare derives its name from the nephelite rocks of Norway, so admirably described by Brögger. In the peralkalic rang laurdalase, the dopotassic subrang is represented by a pseudoleucite-syenite of the Highwood Mountains, while the sodipotassic judithose contains the potash-tinguaites of Montana and a leucite-tinguaite and a nephelite-syenite of Magnet Cove. The dosodic laurdalose includes, besides the typical laurdalite, the tinguaite and mica-syenite of Hedrum, the soda-minette of Haö, with some other nephelite-syenites and tinguaites. The domalkalic essexase contains, in the sodipotassic borolanose, the borolanite from Scotland, the covite from Magnet Cove, a few Montana syenites, and a leucite-tephrite. The dosodic essexose is represented by the typical essexite of Salem Neck, a few Norwegian rocks, including a heumite and a laurdalite, one analysis of the Rongstock essexite, and the Phrygian kulaites. The alkalicalcic salemose contains but few rocks, the most typical of which is the hornblende-gabbro of Salem Neck.

The lenfelic order italare is not large. The peralkalic rang lujavrase embraces the lujavrites of Finland and Greenland, a camptonitic-tinguaite from Portugal, a nephelinite from Alnö, and a basanite from Texas. The domalkalic rang vulturase includes in the dopotassic subrang, to which I have given the name braccianose, leucitites and leucite-tephrites of Bracciano, with a Vesuvian lava, while the dosodic vulturose contains the haüynophyr of Melfi. The alkalicalcic rang includes some Vesuvian lavas and a leucite-tephrite of Rocca Monfina. The dolenic order campanare is represented almost exclusively by Vesuvian lavas, and the perlenic lappare contains, in the sodipotassic subrang arkansose, the leucite-syenite of Magnet Cove, and, in the dosodic urtose, the urtites of Kola and probably the sussexite of New Jersey.

In salfemane the quartzose orders are very scantily represented. The quarfelic atlantare includes only the rockallite of Judd, which is near the border of dosalane, and a pantellerite. The quardofelic order vaalare embraces only a few basalts and diabases, especially some from Cape Colony and the Orange River Colony. These are notable for their low alumina, and while in most the quartz is normative, in some it is modal.

The large perfelic order gallare is represented in general by gabbros, diabases, basalts, etc. Its peralkalic rang orendase includes the orendite and one wyomingite of the Leucite Hills, while two absarokites and a kersantite are the rocks of most interest in the domalkalic kilauase, which includes also some basalts, etc. In the alkalicalcic camptonase the dopotassic absarokose is represented by the most typical of Iddings's absarokites, while in the sodipotassic kentallenose are found, besides the kentallenite of Hill and Kynaston, the olivine-monzonite of Smalingen, and a few lamprophyres, absarokites, and basalts. The dosodic camptonose does not include the original rock analyzed by Hawes, which was not fresh, but a number of typical camptonites from New Hampshire and Norway, besides gabbros, diabases, and basalts. The persodic ornose, so called from the ornoite (basic hornblende-albite rock) of Cederstrom, is also represented chiefly by diabases and basalts. The docalcic auvergnase, named after the basalts of Auvergne, one or two of the older analyses of which fall here, is likewise represented chiefly by gabbros, diabases, and basalts, with a diorite or two. The essexite of Sölvsberg falls here, with a monchiquite and a fourchite from Arkansas, and some of the ariegites of Lacroix. The percalcic order kedabekase is represented almost solely by the kedabekites of Federof, some of Lacroix's ariegites, and some gabbros from Maryland.

In portugare the peralkalic rang is best represented by a wyomingite of the Leucite Hills, an arfvedsonite-tinguaite from Greenland, and a shonkinite and a monchiquite from Montana. The domalkalic monchiquase embraces, in the sodipotassic shonkinose the shonkinites of Square Butte and Yogo Peak, as well as a leucite-basalt and a leucite-syenite of the Highwood Mountains, while in the dosodic monchiquose fall a number of typical monchiquites from Brazil and Montana and some Bohemian tephrites. In the alkalicalcic limburgase the sodipotassic ourose contains two monchiquites, and the dosodic limburgose a number of limburgites, camptonites, essexites, basanites, etc. The docalcic rang contains but few rocks, among them a hornblende-gabbro from Ivrea and a limburgite from Cape Verde.

The lenfelic order kamerunare has few representatives. Among these are, in the peralkalic malignase, the malignites of Lawson; in the domalkalic kamerunase, a leucite-basalt from Montana, a Norwegian heumite, Brögger's farrisite, a theralite of Kola, and nephelinites of the Etinde Volcano in Kamerun. The alkalicalcic etindase contains a ouachitite of Hot Springs (not fresh), with some nephelite-basalts, etc.

The dolenic bohemare is very small, embracing a leucitite of the Bearpaw Mountains, the leucitite of Capo di Bove, a melilite-basalt from the Hegau, the ijolite of Magnet Cove, and a few nephelinites, etc. Finnare includes only the madupite of Cross in the dopotassic madupose, and the Finnish ijolites in the dosodic iiwaarose and the persodic ijolose.

The dofemanes, as has been already remarked, are very few in number, so they may be reviewed briefly. In the perolic order hungarare the perpyric section minnesotiare contains a wehrlite, a cortlandtite, and a limburgite, with gabbros and norites. The missourite of Weed and Pirsson falls here, but is very near the border of salfemane, and in case it were a little more salic or less femic would be found in albanose of bohemare. In the pyrolic hungariare are found wehrlite, peridotites, and picrites, and some gabbros. In the perolic pyreniare occur lherzolites of the Pyrenees, and in the calcimiric section of lherzase the venanzite of Sabatini (euktolite of Rosenbusch).

The dopolic order scotare, in its perpyric section, includes some pyroxenites, especially that of Brandberg. In the dopyric section paoliare are found gabbros, peridotites, some very basic nephelite-basalts, and jacupirangites of Brazil and Magnet Cove. To the pyrolic section texiare belong nephelite-basalts of Texas and Saxony, with melilite-basalts of the Hegau and Westphalia. In the domolic section occur peridotites and melilite-basalts.

The polmitic order sverigare is small, including as yet only an ilmenite-norite, the avezacite of Lacroix, and two melilite-basalts. The domitic order adirondackare includes the ores of the Adirondacks, and probably others not yet analyzed.

The perfemanes are even more scantily represented by analyses than the dofemanes, and analyses of rocks belonging to only one order—the perpolic maorare—are to be found in the collection, though rocks certainly belonging elsewhere in perfemane have been found and described though not analyzed. The perpyric section—caroliniare—includes websterite and other pure pyroxenites, and the dopyric marylandiare contains only a norite, a lherzolite, and a pyroxenite. The domolic section includes a saxonite, a lherzolite, and a peridotite, while the perolic maoriare is represented by dunites of New Zealand, North Carolina, and British Columbia.

METEORITES.

In connection with the correlation of Classes IV and V it may be of interest to call attention to the fact these will include the great majority of meteorites, both stones and irons, if they are of igneous origin, as there is very good reason to consider them in most cases, and so classifiable according to the proposed system. A few will be found in dofemane, but the greater part will undoubtedly belong to perfemane. Those with no or with only negligible amounts of nickel-iron, schreibersite, and troilite would fall in Subclass I of perfemane, like the terrestrial rocks found in the collection and in various sections of the perpolic order maorare, according to the relative amounts of pyroxene and olivine. Those with notable amounts of nickel-iron, etc., would fall in other subclasses, according to their content in these minerals, and in the section corresponding to the presence of these in extreme amount, as compared with apatite, fluorite, etc.

It may be added that the present systems of classification for meteorites are open to the same objections as the older, qualitative, petrographical systems, and that the classification recently proposed is as applicable to these bodies, when of igneous origin, as it is to terrestrial igneous rocks; possibly with some modifications.

CALCULATION OF CENTER POINTS.

INTRODUCTORY.

The analyses presented in Part I give many examples of the chemical compositions of rocks falling in most of the possible classificatory divisions, clustered around the center points, within the limits in variability of composition set by the divisional borders. But it will in the future, probably, often be found interesting, if not useful, to have a knowledge of the theoretical composition of a rock occupying the exact center point of any division, as a basis for comparison.

Before beginning the discussion it will be as well to explain what is meant by a center point and its composition. As will be recalled, the system recently proposed is constructed by a successive dichotomous division of the various rock components, mineral and chemical, and by the selection of certain definite ratios between pairs of these as center points of the several divisions. The division is usually fivefold, but in some instances threefold. In the usual case of the five center points two will be where one factor is present to the exclusion of the other, one where both are present in equal amount, and two where one is present in amount three times the other. In the threefold division one center point will be where both factors are present in equal amount and two where the amount of one is 4.3333+ times that of the other. The last case we may leave out of account, and for the sake of simplicity assume that the two center points here will also be where one factor is present to the exclusion of the other. The error will not be great.

It will be seen that the center points are of two kinds—one where the two factors are present in equal amount or the center point is symmetrical, the other where they are unequal in amount or it is asymmetrical.

If, now, we wish to define the center point of any division and ascertain its composition, it will be necessary to carry the classification down as far as is possible. Otherwise we shall not be complete in our definition and shall not be able to give all the details of the composition. Thus, if we should wish to state the center point of monzonase, for instance, the domalkalic rang of the perfelic order of dosalane, and its composition, we can define it in terms of the higher divisions. The class center point will be where the salic minerals are three times the femic, the order center point where feldspar is present to the exclusion of quartz and lenad, and the rang center point where the alkalies are three times the salic lime. But going further than this we are left in a state of uncertainty, owing to insufficiency of definition. The ratio of potash to soda may be either of the five possible ones, and those of the various femic minerals and their chemical constituents, on which the grads and subgrads are based, may also be any one of five in each case. We must therefore, in such incomplete propositions, make the assumption that below the given division the center point of each successively smaller one will be the symmetrical center point where the factors are present in equal amount.

On the other hand, working up in the contrary direction, if we start with a division which is incapable of further subdivision, we merely follow the center points of the successively higher divisions as they occur according to the definition. Thus, if we wish the composition of liparose, which is incapable of further subdivision into grads, as it is a subrang of persalane, we know that its successive center points are where potash and soda are equal, where alkalies are extreme over lime, where feldspars are dominant over quartz, and finally where the salic minerals are extreme over the femic. With these data we can readily ascertain its center-point composition, both normative and chemical.

It follows from this that in the second, third, and fourth classes the statement of the subrang is not sufficient to enable us to ascertain the composition of the center point, as the relations of the subordinate femic minerals are not stated. In this case we can only make an assumption in regard to them. If we wish absolute knowledge we must have also the grad and subgrad given. Then our data will be complete.

As this system is purely quantitative, so far as the magmatic units are concerned, the problem can be solved in an exact mathematical way, and the process which, it has been found, can be readily and advantageously carried out is here presented.

The basis on which it rests is, that for the center point of each of the hierarchical divisions an equation can be formed expressing mathematically its normative or chemical character. The solution of this, in any given case, yields the composition in terms of the norm, from which the chemical composition is readily found.

As a preliminary, it is to be noted that in classes we are dealing with the relations of the salic and the femic minerals present, these two groups being essentially unlike in chemical character, and consequently to be treated separately. In the divisions from order to subrang, inclusive, and their sections when needed, which may be called collectively the major divisions of class, we have to do only with the preponderant normative minerals. These will be salic in Classes I, II, and III, persalane, dosalane, and salfemane, and will be femic in Classes IV and V, dofemane and perfemane. In the divisions from grad to subgrad, including their sections, which may be called collectively the minor divisions of class, we are dealing with the subordinate normative minerals. These will be femic in Classes I, II, and III, and salic in Classes IV and V.

The problem, therefore, if we wish to determine the composition of the center point as exactly as possible—that is, down to subgrad or a section of this—resolves itself into determining the composition, first, of the preponderant portion, whether salic or femic, then of the subordinate group, whether femic or salic, and combining these in the proportions indicated by the class.

Thus in the persalanes the amount of femic mineral at the ideal center point is nil, and consequently only the composition corresponding to the salic subrang is needed. Conversely, in the perfemanes the composition of the femic portion, i. e., the subrang, is all that we require. In the other classes, on the other hand, we need to have a knowledge of both the appropriate salic or femic subrang and the femic or salic subgrad to give the complete composition of the center point. Letting Σ stand for the composition of the salic portion and Φ for that of the femic, the composition of a dosalane would be $3\Sigma+\Phi$, that of a salfemane $\Sigma+\Phi$, and that of a dofemane $\Sigma+3\Phi$. The chemical composition of the subgrad desired would then be obtained by combining Σ and Φ as found in the proper proportions and reducing to 100 parts.

PERSALANE.

Taking up first the consideration of the composition of the persalanes, which will be that of the dominant salic portion in the dosalanes and the salfemanes, or the subordinate salic portion in the dofemanes, let:

q = the molecules of quartz, or of SiO_2 in quartz.
r = the molecules of orthoclase, or of K_2O in orthoclase.
s = the molecules of albite, or of Na_2O in albite.
t = the molecules of anorthite, or of CaO in anorthite (CaO′).
u = the molecules of leucite, or of K_2O in leucite.
v = the molecules of nephelite, or of Na_2O in nephelite.

To avoid complications, which seem to be unnecessary at present, the minerals of the sodalite group are not considered here.

Then, since the percentage amount of each mineral present is obtained by multiplying its molecular weight by the number of molecules, we shall have:

60q = the percentage of quartz (Q).
556r = the percentage of orthoclase (or).
524s = the percentage of albite (ab).
278t = the percentage of anorthite (an).
436u = the percentage of leucite (lc).
284v = the percentage of nephelite (ne).

The general expression for the persalane class will be: $60q + 556r + 524s + 278t + 436u + 284v = 100$, since Φ vanishes, there being no femic component at the center point. In the subsequent discussion it will be assumed that the subclass is Subclass I, since rocks belonging to other subclasses are very rare, and the principles here given can easily be applied to their calculation.

Taking up the orders, which are based on the relations of quartz, feldspar, and feldspathoid, it will be remembered that, in the principles of calculation which we have adopted, quartz and the lenads (leucite and nephelite) can not exist together. Hence, q on the one hand and either u or v, or both, on the other, are incompatible, and if one be present, according to the definition of the order the other must vanish from the equation.

We shall then have for the general equations representing the several orders of persalane:

Order 1. $q = \infty (556r + 524s + 278t)$.
Order 2. $q = 3 (556r + 524s + 278t)$.
Order 3. $q = 556r + 524s + 278t$.
Order 4. $3q = 556r + 524s + 278t$.
Order 5. $556r + 524s + 278t = \infty (60q)$ or $\infty (436u + 284v)$.
Order 6. $556r + 524s + 278t = 3 (436u + 284v)$.
Order 7. $556r + 524s + 278t = 436u + 284v$.
Order 8. $3 (556r + 524s + 278t) = 436u\ 284v$.
Order 9. $436u + 284v = \infty (556r + 524s + 278t)$.

It will be seen that the equations for orders 1, 5, and 9 are equivalent to the equation for the class with the absent quantities omitted.

In dealing with the equations for orders 6, 7, 8, and 9 the principle adopted by us in regard to leucite and nephelite must be borne in mind, namely, that to K_2O' is allotted all the silica possible before normative albite is calculated, so that normative leucite and albite can not coexist, the Na_2O' forming only nephelite if leucite is necessarily present. An example illustrating this will be given below.

The rangs of persalane are based on the relations of the total alkalies in feldspars and lenads to the lime in anorthite, CaO'. The equations for rang will therefore be:

Rang 1. $r + s = \infty t$
Rang 2. $r + s = 3t$
Rang 3. $r + s = t$
Rang 4. $3(r + s) = t$
Rang 5. $t = \infty (r + s)$

Here again it is seen that the equations for rangs 1 and 5 are coincident with that for the order, and that consequently for these no separate equations are needed.

The subrangs of persalane are based on the relations of the K_2O and Na_2O in the feldspars and lenads, and are:

Rang 1. $r = \infty s$
Rang 2. $r = 3s$
Rang 3. $r = s$
Rang 4. $3r = s$
Rang 5. $s = \infty r$

Equations for rangs 1 and 5 will not be needed.

The above are the general expressions, but the processes may be somewhat simplified in many cases by taking advantage of known relations and conditions, and a few examples are given in illustration of the actual method of procedure. The use of logarithms will be found very convenient, and a seven-place table was used in calculating all the results given in the annexed tables, insuring accuracy in the last decimal and greatly shortening the time necessary for the calculations.

The first illustration may be the center point of *toscanose*, belonging to Class I, persalane; order 4, britannare (quardofelic, or with feldspar dominant over quartz, i. e. in ratio 3:1); rang 2, toscanase (domalkalic, or with alkalies to salic lime in the proportion of 3:1); subrang 3, toscanose (sodipotassic, or potash and soda in equal amount). The equations needed will be:

$60q + 556r + 524s + 278t = 100$ (Class)
$180q = 556r + 524s + 278t$ (Order)

As the percentage amount of the normative quartz present is known from the definition of the order, these two may be conveniently replaced by the equations:

$556r + 524s + 278t = 75$, and $60q = 25$
$r + s = 3t$ (Rang)
$r = s$ (Subrang)

The solution of these yields the results:

$$r = .059273$$
$$s = .059273$$
$$t = .039515$$

From which we calculate the norm to be:

Quartz	25.00
Orthoclase	32.96
Albite	31.06
Anorthite	10.98
	100.00

This gives the chemical composition as:

SiO_2	72.37
Al_2O_3	16.16
CaO	2.22
Na_2O	3.68
K_2O	5.57
	100.00

Another example may be that of laurvikose, in Class I, persalane; order 5, canadare (perfelic); rang 2, pulaskase (domalkalic); and subrang 4, laurvikose (dosodic). Here, there being no normative quartz or lenad, the equation for order is not needed, and we shall have:

$$556r + 524s + 278t = 100 \quad \text{(Class).}$$
$$r + s = 3t \quad \text{(Rang)}$$
$$3r = s \quad \text{(Subrang)}$$

These yield on solution:

$$r = .040021$$
$$s = .120063$$
$$t = .053361$$

From which we derive the norm:

Orthoclase	22.25
Albite	62.91
Anorthite	14.84
	100.00

The chemical composition is:

SiO_2	64.03
Al_2O_3	21.79
CaO	2.98
Na_2O	7.44
K_2O	3.76
	100.00

As a final example we may take up the centerpoint of miaskose, illustrating the procedure when normative lenad (feldspathoid) is present, but when we can not tell a priori whether it is leucite or nephelite or both. Miaskose belongs in Class I, persalane, order 6, russare (lendofelic, or with feldspars dominant over lenads), rang 1, miaskase (peralkalic) and subrang 4, miaskose (dosodic).

Let us first assume that leucite may be present, in which case there can be no albite in the norm, as explained above. As the rang is peralkalic, there will be no equation for rang, and we shall have:

$$556r + 436u + 284v = 100 \qquad \text{(Class)}$$
$$556r = 3\ (436u + 284v) = 1308u + 852v \qquad \text{(Order)}$$
$$3r + 3u = v \qquad \text{(Subrang)}$$

Substituting for v in the equation for order we get:

$$556r = 1308u + 2556r + 2556u$$

which reduces to:

$$-2000r = 3864u$$

This equation is absurd, and we therefore know that leucite can not be present in the norm of miaskose. In its absence all the potash must go into orthoclase, and the soda will be divided up between albite and nephelite. On this basis we shall have:

$$556r + 524s + 284v = 100 \qquad \text{(Class)}$$
$$556r + 524s = 852v \qquad \text{(Order)}$$
$$3r = s + v \qquad \text{(Subrang)}$$

From these we derive the figures:

$$r = .056912$$
$$s = .082707$$
$$v = .088028$$

Whence we get the norm:

Orthoclase	31.66
Albite	43.34
Nephelite	25.00
	100.00

And the chemical composition will be:

SiO_2	60.83
Al_2O_3	23.23
Na_2O	10.59
K_2O	5.35
	100.00

The calculated center points for all the possible subrangs of Subclass I of persalane are given in Table VI. In the case of threefold divisions, as in the subrangs of docalcic rangs, the subrangs 1 and 3 were assumed to be of the same character as subrangs 1 and 5, where the division is fivefold. Thus, subrang 3 of a docalcic rang is assumed to be persodic, not presodic, and the small amount of potash is neglected, or rather assumed to be absent.

It will be found interesting to compare these with the analyses of the persalane rocks in Part I of the collection. It must be remembered, however, that the figures given in Table VI are of the ideal center points, and that the presence of femic or alferric minerals, or of small amounts of other standard minerals, in the mode, will often cause marked divergences in the actual rock analysis from these. Thus, as a general rule, the dark minerals present will decrease the amount of silica, alumina, and alkalies, and often raise that of lime. Similarly, a small amount of modal quartz will raise the actual silica, while a little nephelite will decrease it. It must also be remembered that few of the rocks are exactly at the center point of their divisions, even so far as the salic components are concerned, which will, of course, cause more or less divergence from the ideal composition.

With a little study it will be found that the reasons for any given divergence are quite evident in most cases when the description of the rock is sufficiently complete. It will also be found that such study, supplemented by comparison of the actual rocks with their ideal center points, gives one a much clearer insight into the mutual chemical relations of the rock-forming minerals than is easily obtained otherwise.

PERFEMANE.

When the calculation of the center points of the perfemanes is undertaken, it is immediately seen that the subject is much more complex than that of the persalanes, though the same principles apply in both cases.

In the first place there are a greater number of successive pairs of factors, owing to the greater complexity in chemical composition of the rocks belonging to this class. Thus, in the persalanes we have to deal, in most cases, with only four hierarchical divisions, namely, class, order, rang, and subrang. In the perfemanes, on the other hand, we must consider at least six, class, order, section of order, rang, section of rang, and subrang, with possibly suborder, section of suborder, and section of subrang, or some such division to express the relations of magnetite and ilmenite, or of Fe_2O_3 and TiO_2 (in all orders except the first), which must be considered in the calculation.

In the perfemanes also several of the chemical constituents are distributed between various mineral groups or subgroups, more often than is the case in the persalanes. Thus CaO may occur as metasilicate in diopside and wollastonite, as subsilicate in akermanite, and also in apatite and fluorite. MgO and FeO are found in the metasilicates, diopside, and hypersthene, and in the orthosilicate olivine, while FeO also occurs in the mitic minerals, magnetite, and ilmenite. Fe_2O_3 is found both in acmite and magnetite, and Na_2O' in acmite and in Na_2SiO_3.

A further feature which adds somewhat to the complexity is the fact that among the femic minerals, notwithstanding their greater number, there are few cases of antithesis between minerals; that is, pairs of minerals which, from the principles on which the calculation of the norm is founded, can not coexist in the norm. In the persalanes quartz and the lenads are mutually antithetical, but in the perfemanes representatives of the pyric, olic, and mitic subgroups can all exist simultaneously, as, for instance, diopside, hypersthene, olivine, magnetite, and ilmenite. The only case of antithesis of any practical importance in the perfemanes is that of hypersthene and akermanite, though, according to the methods already published by us, akermanite can coexist with the hypersthene included in the diopside molecule.

If the mixed molecule of diopside, CaO. (Mg,Fe)O. $2SiO_2$, be considered in calculating the perfemane center points, the matter becomes very complex in many cases, since there are numerous possibilities as to the mutual relations of this molecule, and those of olivine and akermanite. For purposes of simplification, therefore, I have, in the subsequent calculations, disregarded this molecule, that is, have considered $CaSiO_3$, $MgSiO_3$, and $FeSiO_3$ as being independent of each other. This point will probably be discussed in a future publication.

These various complications introduce an increased number of equations to be solved, and therefore add much to the labor of calculating the center points of the perfemanes, though, as has been said above, no change in the principles from those obtaining in the persalanes is involved.

After the explanations which have been given for the persalanes it will be unnecessary to give here the general equations, especially in view of their increased number. It will suffice to give a few examples illustrative of the various points to be considered.

Before entering upon these one important point must be mentioned in which the calculation of the perfemanes differs from that of the persalanes. It will be remembered that in the latter K_2O is assumed to have a greater affinity for SiO_2 than has Na_2O, and that consequently, while the former can occur both in orthoclase and leucite and the latter both in albite and nephelite, leucite is formed in preference to albite if the amount of SiO_2 is insufficient to yield only polysilicate with the two alkalies. In the constituents of the femic minerals, on the other hand, there is no such marked difference in affinity for SiO_2 between MgO and FeO, so that these two oxides are distributed in equal ratios between diopside, hypersthene, and olivine (if all are present), after FeO has been allotted to magnetite and ilmenite.

It must furthermore be borne in mind that, while among the salic minerals the number of mineral molecules is the same as that of the unit oxide, in the femic minerals there are several important cases where this does not apply. Thus the number of molecules of orthoclase or of leucite is the same as that of the K_2O in each, but in olivine the number of molecules of (Mg,Fe)O is twice, and in akermanite that of CaO is four times, that of the respective mineral molecules.

In the calculations of the perfemane center points I have adopted the following symbols:

a = mol. of $CaSiO_3$. a = molecules of CaO in wollastonite.
b = mol. of $MgSiO_3$. b = molecules of MgO in enstatite.
c = mol. of $FeSiO_3$. c = molecules of FeO in ferrosilite.
d = mol. of Mg_2SiO_4. 2d = molecules of MgO in forsterite.
e = mol. of Fe_2SiO_4. 2e = molecules of FeO in fayalite.
f = mol. of FeO. Fe_2O_3. f = molecules of FeO and of Fe_2O_3 in magnetite.
g = mol. of FeO. TiO_2. g = molecules of FeO and of TiO_2 in ilmenite.
h = mol. of 4CaO. $3SiO_2$. 4h = molecules of CaO in akermanite.
k = mol. of Na_2O. Fe_2O_3. $4SiO_2$. k = molecules of Na_2O and of Fe_2O_3 in acmite.

We shall then have:

$116a$ = per cent of wollastonite (wo).
$100b$ = per cent of enstatite (en).
$132c$ = per cent of ferrosilite[a] (fs).
$140d$ = per cent of forsterite (fo).
$204e$ = per cent of fayalite (fa).
$232f$ = per cent of magnetite (mt).
$152g$ = per cent of ilmenite (il).
$404h$ = per cent of akermanite (am).
$436k$ = per cent of acmite (ac).

Let us take as the first illustration Class V, order 1, section of order 2, rang 1, section of rang 2, subrang 3. This is perfemic, perpolic, dopyric, permirlic, domiric, and magnesiferrous. We have as equations expressing these relations, and the equal relations of MgO and FeO in the hypersthene and olivine, the following:

(1) $116a + 100b + 132c + 140d + 204e = 100$ (Class).
(2) $116a + 100b + 132c = 3\ (140d + 204e)$ (Section of order).

This may be conveniently written:

(3) $116a + 100b + 132c = 75$, and
(4) $140d + 204e = 25$
(5) $3a = b + c + 2d + 2e$ (Section of rang).
(6) $b = c$, and
(7) $d = e$ (Subrang).

Analogously with similar cases in the persalanes, as already explained, no equations are necessary to express the order or rang.

Substituting (5) in (3) we obtain:

$$\frac{116b + 116b + 232d + 232e}{3} + 100b + 132b = 75, \text{ whence}$$

$$928b = 225 - 232d - 232e.$$

From (4) and (7) we get $344d = 344e = 25$.

Solving these we obtain for the values of a, b, etc.:

$a = .23431$
$b = .20612$
$c = .20612$
$d = .072675$
$e = .072675$

whence we obtain the norm:

Wollastonite..	27.18
Enstatite	20.61
Ferrosilite	27.21
Forsterite.....	10.17
Fayalite	14.83
	100.00

---

[a] As it was found to be necessary to have some name for the purely ferrous hypersthene molecule, $FeSiO_3$, which has not yet been observed in nature, and for which, there is no term in use, I have employed the name ferrosilite for this, following a suggestion made by Professor Iddings.

From this the chemical composition is calculated to be:

SiO_2	47.52
FeO	25.31
MgO	14.05
CaO	13.12
	100.00

Another example is given, introducing magnetite and ilmenite. This may be Class V, order 2, section of order 3, rang 1, section of rang 2, subrang 2, and what may be called section of subrang 2, in which hematite : ilmenite = 3 : 1. We shall have for this center point the following equations:

$$\begin{array}{lll}
(1) & 116a+100b+132c+140d+204e+232f+152g=100 & \text{(Class)} \\
(2) & 116a+100b+132c+140d+204e=75 \text{ and} & \multirow{2}{*}{\}\ \text{(Order)}} \\
(3) & 232f+152g=25 & \\
(4) & 116a+100b+132c=37.50 \text{ and} & \multirow{2}{*}{\}\ \text{(Section of order)}} \\
(5) & 140d+204e=37.50 & \\
(6) & 3a=b+c+2d+2e+f+g & \text{(Section of rang)} \\
(7) & b=3c \text{ and} & \multirow{2}{*}{\}\ \text{(Subrang)}} \\
(8) & d=3e & \\
(9) & 232f=456g & \text{(Section of subrang)}
\end{array}$$

From (3) and (9) we obtain the values of f and g, and from (5) and (8) the values of d and e. Substituting (6) in (1) we get:

$$\frac{116b+116c+232d+232e+116f+116g}{3}+100b+132c+140d+204e+232f+152g=100$$

This reduces to:

$$1760c=300-652d-844e-812f-572g=42.60,$$

and so we obtain the values:

$a = .23319$
$b = .07263$
$c = .02421$
$d = .18030$
$e = .06010$
$f = .08082$
$g = .04112$

These yield the norm:

Wollastonite	27.04
Enstatite	7.26
Ferrosilite	3.20
Fosterite	25.24
Fayalite	12.26
Magnetite	18.75
Ilmenite	6.25
	100.00

which give the chemical composition of this center point as:

SiO_2 ...	34.23
Fe_2O_3 ..	12.93
FeO ...	19.17
MgO ...	17.32
CaO ...	13.06
TiO_2 ...	3.29
	100.00

Similar equations may be formed for the various rangs which contain acmite, etc., but it is scarcely worth while to give illustrations of them here.

In Table VII are given the calculated center points of order 1 of perfemane, the only rang represented being rang 1—that is, rocks with neither normative magnetite nor ilmenite nor with acmite. This incompleteness is regretted, but the very large number of equations to be solved, and of percentages of minerals and chemical constituents to be determined, rendered a complete exposition of this class quite out of the question with the time at my disposal. It is hoped that at some not far distant date complete tables will be made both of the other orders and rangs of perfemane and of the corundum- and zircon-bearing subclasses in persalane.

In combining the data of Tables VI and VII, to obtain the composition of any given center point for grads and subgrads in Classes II, III, or IV, the mutually antithetical character of various salic and femic minerals, based on the methods of calculation of the norm which we have adopted, and which preclude their coexistence, must be borne in mind. Thus, in Classes II and III, no grad characterized by the presence of olivine is possible when the salic portion contains quartz; none with hypersthene when nephelite or leucite is present; none containing diopside, wollastonite, or acmite when corundum is present; none with acmite when anorthite exists; nor one with akermanite when feldspar occurs in the salic portion. The converse relations hold good in Class IV.

TABLE VI.—CALCULATED CENTER POINTS OF CLASS I, PERSALANE.

Order	1. $\frac{Q}{F}=\frac{1}{0}$	2. $\frac{Q}{F}=\frac{3}{1}$												
Rang		1. Peralkalic.			2. Domalkalic.			3. Alkalicalcic.			4. Docalcic.			5. Percalcic.
Subrang		1	2	3	1	2	3	1	2	3	1	2	3	1
Q	100.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Or		25.00	12.87		21.43	11.00		16.67	8.50		10.00	5.06		
Ab			12.13	25.00		10.35	21.24		8.00	16.33		4.77	9.67	
An					3.57	3.65	3.76	8.33	8.50	8.67	15.00	15.17	15.33	25.00
SiO_2	100.00	91.19	91.70	93.17	90.42	90.77	91.22	89.39	89.67	89.96	87.88	88.08	88.26	85.79
Al_2O_3		4.59	4.72	4.87	5.24	5.38	5.52	6.11	6.24	6.36	7.43	7.45	7.51	9.18
CaO					0.72	0.74	0.75	1.68	1.71	1.75	3.01	3.05	3.09	5.03
Na_2O			1.44	2.96		1.25	2.51		0.95	1.93		0.57	1.14	
K_2O		4.22	2.14		3.62	1.86		2.82	1.43		1.68	0.85		

Order	3. $\frac{Q}{F}=\frac{1}{1}$																		
Rang	1. Peralkalic.					2. Domalkalic.					3. Alkalicalcic.					4. Docalcic.			5. Percalcic.
Subrang	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	1
Q	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Or	50.00	38.05	25.74	13.06		42.86	32.55	21.97	11.13		33.33	25.24	16.99	8.59		20.00	10.12		
Ab		11.95	24.26	36.94	50.00		10.22	20.71	31.45	42.49		7.93	16.02	24.25	32.67		9.53	19.29	
An						7.14	7.23	7.32	7.42	7.51	16.67	16.83	16.99	17.16	17.33	30.00	30.35	30.71	50.00
SiO_2	82.37	82.85	83.32	83.81	84.35	80.83	81.21	81.58	82.01	82.43	78.78	79.05	79.33	79.63	79.93	75.76	76.15	76.50	71.58
Al_2O_3	9.18	9.31	9.44	9.59	9.73	10.48	10.62	10.77	10.90	11.03	12.23	12.35	12.48	12.60	12.72	14.87	14.90	15.03	18.35
CaO						1.44	1.46	1.48	1.49	1.51	3.35	3.39	3.42	3.45	3.49	6.01	6.11	6.19	10.07
Na_2O		1.41	2.87	4.37	5.92		1.41	2.45	3.72	5.03		0.94	1.90	2.87	3.86		1.13	2.28	
K_2O	8.45	6.43	4.17	2.21		7.25	5.50	3.72	1.88		5.64	4.27	2.87	1.45		3.26	1.71		

TABLE VI.—CALCULATED CENTER POINTS OF CLASS I, PERSALANE—Continued.

Order	4. $\frac{Q}{F}=\frac{1}{3}$																	
Rang	1. Peralkalic.					2. Domalkalic.					3. Alkalicalcic.					4. Docalcic.			5. Percalcic.
Subrang	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	1
Q	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Or	75.00	57.07	38.61	19.60	....	64.29	48.82	32.96	16.69	....	50.00	37.86	25.49	12.87	....	30.00	15.18	....	....
Ab	....	17.93	36.39	55.40	75.00	....	15.33	31.06	47.19	63.73	....	11.90	24.02	36.39	49.00	....	14.30	28.94	....
An	....	....	....	....	....	10.71	10.85	10.98	11.12	11.27	25.00	25.24	25.49	25.74	26.00	45.00	45.52	46.06	75.00
SiO_2	73.61	74.27	74.98	75.73	76.53	71.25	71.82	72.37	73.02	73.61	68.17	68.58	69.00	69.45	69.89	63.84	64.29	64.77	57.37
Al_2O_3	13.76	13.96	14.16	14.39	14.60	15.72	15.92	16.16	16.34	16.55	18.35	18.53	18.71	18.89	19.08	22.03	22.29	22.53	27.53
CaO	....	....	....	....	....	2.16	2.19	2.22	2.24	2.25	5.03	5.08	5.14	5.18	5.23	9.06	9.17	9.88	15.10
Na_2O	....	2.12	4.32	6.56	8.87	....	1.82	3.68	5.58	7.55	....	1.41	2.84	4.31	5.80	....	1.70	3.42	....
K_2O	12.63	9.65	6.56	3.32	....	10.87	8.25	5.57	2.82	....	8.45	6.40	4.31	2.17	....	5.07	2.56	....	....

Order	5. $\frac{Q, L}{F}=\frac{0}{1}$																	
Rang	1. Peralkalic.					2. Domalkalic.					3. Alkalicalcic.					4. Docalcic.			5. Percalcic.
Subrang	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	1
Or	100.00	76.36	51.48	26.13	....	85.71	65.09	43.94	22.25	....	66.67	50.47	33.99	17.18	....	40.00	20.24	....	....
Ab	....	23.90	48.52	73.87	100.00	....	20.44	41.41	62.91	84.97	....	15.86	32.02	48.52	65.34	....	19.07	38.59	....
An	....	....	....	....	....	14.29	14.47	14.65	14.84	15.03	33.33	33.66	33.99	34.32	34.66	60.00	60.70	61.41	100.00
SiO_2	64.75	65.70	66.62	67.66	68.70	61.67	62.43	63.16	64.03	64.86	57.56	58.11	58.66	59.26	59.85	51.52	52.30	53.02	43.16
Al_2O_3	18.35	18.61	18.89	19.18	19.47	20.96	21.23	21.54	21.79	22.06	24.46	24.70	24.96	25.19	25.44	29.74	29.79	30.04	36.70
CaO	....	....	....	....	....	2.88	2.92	2.96	2.98	3.02	6.71	6.78	6.85	6.91	6.98	12.02	12.22	12.37	20.14
Na_2O	....	2.83	5.74	8.74	11.83	....	2.42	4.91	7.44	10.06	....	1.88	3.79	5.74	7.73	....	2.27	4.57	....
K_2O	16.90	12.86	8.75	4.42	....	14.49	11.09	7.43	3.76	....	11.27	8.53	5.74	2.90	....	6.72	3.42	....	....

TABLE VI.—CALCULATED CENTER POINTS OF CLASS I, PERSALANE—Continued.

Order	$6. \frac{L}{F} \frac{1}{3}$																	
Rang	1. Peralkalic.					2. Domalkalic.					3. Alkalicalcic.					4. Docalcic.		
Subrang	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3
Or	75.00	75.00	62.35	31.66		59.61	58.48	53.23	26.95		39.37	37.20	34.69	20.79		10.87	6.07	
Ab			12.65	43.34	75.00			4.03	30.08	56.80				12.64	33.01			0.61
An						15.39	16.52	17.74	17.97	18.20	35.63	37.80	40.31	41.57	41.99	64.13	68.93	74.39
Lc	25.00	10.05				25.00	12.36				25.00	15.34	4.42			25.00	13.26	
Ne		14.95	25.00	25.00	25.00		12.64	25.00	25.00	25.00		9.66	20.58	25.00	25.00		11.74	25.00
SiO_2	62.32	60.41	59.62	60.83	62.08	59.00	57.14	55.45	56.44	57.43	54.63	52.92	50.99	50.64	51.35	48.47	45.92	43.09
Al_2O_3	19.61	21.48	22.88	23.23	23.59	22.44	24.22	26.04	26.37	26.72	26.15	27.76	29.59	30.52	30.82	31.38	33.75	36.40
CaO						3.10	3.33	3.57	3.62	3.67	7.18	7.61	8.12	8.37	8.46	12.92	13.88	14.98
Na_2O		3.26	5.46	10.59	14.33		2.76	5.94	9.02	12.18		2.11	4.49	6.96	9.37		2.56	5.53
K_2O	18.07	14.85	12.04	5.35		15.46	12.55	9.00	4.55		12.04	9.60	6.81	3.51		7.23	3.89	

Order	$7. \frac{L}{F} = \frac{1}{1}$														
Rang	1. Peralkalic.					2. Domalkalic.					3. Alkalicalcic.				
Subrang	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Or	50.00	50.00	50.00	37.17		33.75	32.44	30.89	29.05		12.08	9.71	7.09	4.08	
Ab				12.83	50.00					28.62					0.69
An						16.25	17.56	19.11	20.95	21.38	37.92	40.29	42.91	45.92	49.31
Lc	50.00	34.09	14.81			50.00	36.54	20.72	1.86		50.00	39.72	28.08	14.82	
Ne		15.91	35.19	50.00	50.00		13.46	29.28	48.14	50.00		10.28	21.92	35.18	50.00
SiO_2	59.90	57.86	55.39	51.00	55.48	56.39	54.39	52.02	49.21	50.01	51.71	49.89	47.83	45.48	42.87
Al_2O_3	20.87	22.87	25.29	27.28	27.69	23.86	25.77	28.05	30.75	31.38	27.83	29.55	31.49	33.71	36.19
CaO						3.27	3.54	3.85	4.22	4.31	7.64	8.11	8.64	9.25	9.93
Na_2O		3.47	7.68	12.44	16.83		2.94	6.39	10.51	14.30		2.25	4.79	7.68	11.01
K_2O	19.23	15.80	11.64	6.28		16.48	13.36	9.69	5.31		12.82	10.20	7.25	3.88	

TABLE VI.—CALCULATED CENTER POINTS OF CLASS I, PERSALANE—Continued.

Order	8. $\frac{L}{F} = \frac{3}{1}$									
Rang	1. Peralkalic.					2. Domalkalic.				
Subrang	1	2	3	4	5	1	2	3	4	5
Or	25.00	25.00	25.00	25.00	....	7.77	6.37	4.74	2.79	....
Ab	....	....	....	....	25.00	....	....	....	....	0.45
An	....	....	....	....	....	17.23	18.63	20.26	22.21	24.55
Lc	75.00	58.12	37.68	12.42	....	75.00	60.73	43.95	23.04	....
Ne	....	16.88	37.32	62.58	75.00	....	14.27	31.05	51.06	75.00
SiO_2	57.48	55.31	52.70	49.46	48.85	53.76	51.62	49.12	46.15	42.59
Al_2O_3	22.13	24.25	26.81	29.98	31.81	25.29	27.34	29.74	32.60	36.04
CaO	....	....	....	....	....	3.47	3.75	4.08	4.47	4.94
Na_2O	....	3.69	8.15	13.66	19.34	....	3.12	6.78	11.15	16.43
K_2O	20.39	16.75	12.34	6.90	....	17.48	14.17	10.28	5.63	....

Order	9. $\frac{L}{F} = \frac{1}{0}$				
Rang	1. Peralkalic.				
Subrang	1	2	3	4	5
Lc	100.00	82.16	60.55	33.85	....
Ne	....	17.84	39.45	66.15	100.00
SiO_2	55.05	52.77	50.00	46.58	42.25
Al_2O_3	23.39	25.63	28.34	31.68	35.92
Na_2O	....	3.89	8.61	14.44	21.83
K_2O	21.56	17.71	13.05	7.30	....

TABLE VII.—CALCULATED CENTER-POINTS OF CLASS V, PERFEMANE. ORDER 1, $\frac{P,O}{M}=\frac{1}{0}$

Section of order	1. $\frac{P}{O}=\frac{1}{0}$																		
Rang 1. Section of rang	1. Permiric.					2. Domiric.					3. Calcimiric.					4. Docalcic.			5. Percalcic.
Subrang	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	1
Wo						27.89	26.36	25.00	23.77	22.66	53.70	51.79	50.00	48.33	46.77	77.68	75.00	72.50	100.00
En	100.00	69.44	43.10	20.16		72.11	51.14	32.33	15.37		46.30	33.48	21.55	10.42		22.32	10.78		
Fs		30.56	56.90	79.84	100.00		22.50	42.67	60.86	77.34		14.73	28.45	41.25	53.23		14.22	27.50	
Fo																			
Fa																			
Am																			
SiO₂	60.00	55.55	51.72	48.39	45.45	57.70	54.54	51.72	49.17	46.87	55.56	53.58	51.72	50.00	48.38	53.58	51.72	50.00	51.72
FeO		16.67	31.04	43.55	54.55		12.27	23.28	33.20	42.19		8.03	15.52	22.50	29.04		7.76	15.00	
MgO	40.00	27.78	17.24	8.06		28.84	20.46	12.93	6.15		18.52	13.39	8.62	4.17		8.92	4.31		
CaO						13.46	12.73	12.07	11.48	10.94	25.92	25.00	24.14	23.33	22.58	37.50	36.21	35.00	48.28

Section of order	2. $\frac{P}{O}=\frac{3}{1}$																		
Rang 1. Section of rang	1. Permiric.					2. Domiric.					3. Calcimiric.					4. Docalcic.			5. Percalcic.
Subrang	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	1
Wo						30.87	28.89	27.18	25.67	24.32	59.46	56.77	54.35	52.20	50.21	75.00	75.00	75.00	75.00
En	75.00	52.08	32.33	15.12		41.13	32.02	20.61	9.95		15.54	12.66	8.89	4.60					
Fs		22.92	42.67	59.88	75.00		14.09	27.21	39.38	50.68		5.57	11.74	18.20	24.79				
Fo	25.00	16.83	10.17	4.65		25.00	16.83	10.17	4.65		25.00	16.83	10.17	4.65		16.95	8.12		
Fa		8.17	14.83	20.35	25.00		8.17	14.83	20.35	25.00		8.17	14.83	20.35	25.00		11.84	22.74	
Am																8.05	5.04	2.26	25.00
SiO₂	55.72	51.28	47.51	41.27	41.44	53.16	50.17	47.52	45.13	42.97	50.79	49.11	47.52	46.01	44.59	49.63	47.99	46.49	49.93
FeO		18.27	33.75	47.02	58.56		13.45	25.31	35.84	45.29		8.81	16.87	24.29	31,17		8.36	16.05	
MgO	41.28	30.45	18.74	8.71		31.94	22.43	14.05	6.64		20.51	14.68	9.37	4.50		9.69	4.64		
CaO						14.90	13.95	13.12	12.39	11.74	28.70	27.40	26.24	25.20	24.24	40.68	39.01	37.46	50.07

Table VII.—CALCULATED CENTER-POINTS OF CLASS V, PERFEMANE—Continued.

Section of order	$3. \frac{P}{O}=\frac{1}{1}$																		
Rang 1. Section of rang.	1. Permiric.					2. Domiric.					3. Calcimiric.					4. Docalcic.			5. Percalcic.
Subrang	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	1
Wo	....	....	....	....	....	33.86	31.44	29.86	27.57	25.49	50.00	50.00	50.00	50,00	50.00	50.00	50.00	50.00	50.00
En	50.00	34.72	21.55	10.08	....	16.14	12.89	8.90	4.52	....	....	....	....	....	....	....	....	....	....
Fs	....	15.28	28.45	39.92	50.00	....	5.67	11.74	17.91	24.01	....	....	....	....	....	....	....	....	....
Fo	50.00	33.65	20.35	9.31	....	50.00	33.65	20.65	20.35	9.31	38.29	27.43	17.51	8.39	....	17.55	8.42	....	....
Fa	....	16.35	29.65	40.69	50.00	....	16.35	29.65	40.69	50.00	....	13.33	25.51	36.70	47.00	....	12.26	23.56	....
Am	....	....	....	....	....	....	....	....	....	....	11.71	9.24	6.98	4.91	3.00	32.45	29.32	26.44	50.00
SiO_2	48.57	47.00	43.30	40.16	37.43	48.62	45.80	43.30	41.08	39.05	47.49	45.65	43.98	42.45	41.02	47.84	46.14	44.57	51.86
FeO	....	19.88	36.45	50.49	62.57	....	14.63	27.34	38.48	48.40	....	9.41	18.01	25.90	33.18	....	8.66	16.63	....
MgO	51.43	33.12	20.25	9.35	....	35.03	24.39	15.19	7.13	....	21.88	15.68	10.00	4.79	....	10.08	4.81	....	....
CaO	....	....	....	....	....	16.35	15.18	14.17	13.31	12.55	30.63	29.26	28.01	26.86	25.80	42.13	40.39	38.80	48.14
Section of order	$4. \frac{P}{O}=\frac{1}{3}$																		
Rang 1. Section of rang.	1. Permiric.					2. Domiric.					3. Calcimiric.					4. Docalcic.			5. Percalcic.
Subrang	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	1
Wo	....	....	....	....	....	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
En	25.00	17.36	10.78	5.04	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fs	....	7.64	14.22	19.96	25.00	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fo	75.00	50.48	30.52	13.96	....	65.34	45.50	28.30	13.25	....	39.61	28.38	18.11	8.68	....	18.16	8.71	....	....
Fa	....	24.52	44.48	61.04	75.00	....	22.10	41.24	58.00	72.76	....	13.79	26.39	37.96	48.62	....	12.69	24.37	....
Am	....	....	....	....	....	9.66	7.40	5.46	3.75	2.24	35.39	32.83	30.50	28.36	26.88	56.84	53.60	50.63	75.00
SiO_2	52.85	42.75	39.10	36.03	33.42	45.23	42.23	39.62	37.34	35.33	45.67	43.78	42.04	40.45	38.98	46.03	44.27	42.66	46.34
FeO	....	21.48	39.15	53.97	66.58	....	15.60	29.11	40.93	51.36	....	9.73	18.63	26.80	34.32	....	8.96	17.20	....
MgO	47.15	35.79	21.75	10.00	....	37.34	26.00	16.17	7.58	....	22.64	16.22	10.35	4.96	....	10.38	4.98	....	....
CaO	....	....	....	....	....	17.43	16.17	15.10	14.15	13.31	31.69	30.27	28.98	27.79	26.70	43.59	41.79	40.14	53.66

TABLE VII.—CALCULATED CENTER-POINTS OF CLASS V, PERFEMANE—Continued.

Section of order	$5.\ \frac{P}{O}=\frac{0}{1}$																		
Rang 1. Section of rang.	1. Permiric.					2. Domiric.					3. Calcimiric.					4. Docalcic.			5. Percalcic.
Subrang	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	1
Wo																			
En																			
Fs																			
Fo	100.00	67.31	40.70	18.62		67.52	47.01	29.25	13.71		40.94	29.33	18.72	8.97		18.77	9.00		
Fa		32.69	59.30	81.38	100.00		22.84	42.62	59.92	75.18		14.25	27.27	39.23	50.25		13.11	25.19	
Am						18.01	16.72	15.60	14.62	13.76	59.06	56.42	54.01	51.80	49.75	81.23	77.89	74.81	100.00
SiO_2	42.86	38.46	34.88	31.91	29.41	43.40	40.29	37.61	35.25	33.17	43.86	41.90	40.10	38.47	36.95	44.24	42.43	40.74	44.55
FeO		23.08	41.86	57.45	70.49		16.12	30.08	42.30	53.07		10.06	19.25	27.69	35.47		9.25	17.78	
MgO	57.14	38.46	23.26	10.64		38.59	26.87	16.71	7.83		23.39	16.76	10.70	5.12		10.72	5.14		
CaO						18.01	16.72	15.60	14.62	13.76	32.75	31.28	29.95	28.72	27.58	45.04	43.18	41.48	55.45

THE DISTRIBUTION OF MAGMAS AND THE AVERAGE ROCK.

INTRODUCTORY.

The large number of analyses given in this collection affords such a broad view of igneous rocks that it will be interesting to examine the quantitative distribution of the magmas of various characters. To a certain extent this distribution is a matter of common knowledge; but based as this is on analyses arranged according to older, less precise, and more qualitative classifications, it lacks the definiteness of that which may be obtained from a study of analyses classified quantitatively according to their chemico-mineralogical characters.

In view of the fact that most of the inferior analyses of rocks are not classified according to the new system, all analyses of these two lowest ratings will be neglected, even if found in Part I of the collection, and the examination will be confined entirely to the superior analyses of the first three ratings—i. e., excellent, good, and fair—present in Part I.

In the statement of the magmatic divisions presented in Table I there is given with each division the number of analyses of the first three ratings found in Part I of the collection. These amount in all to 1,711, or 59.39 per cent of the total number of analyses (2,881) which are given in both parts. The distribution of ratings has been discussed elsewhere.

As a preliminary to the discussion it must be remarked that any generalizations from these figures are liable to the error common to all statistical methods, namely, the uncertainty that the data truly represent the exact state of affairs. In this instance, for example, it may be that there is an undue proportion of analyses of common rocks, granites, diorites, andesites, etc., since these rocks have been most frequently studied, and hence probably analyzed relatively more often than rarer ones. But, on the other hand, the present interest in unusual types may render the analyses of some of these, as, for instance, the nephelite-bearing rocks, more abundant relatively to the common ones than is actually true in nature. As an example of the first error it may be mentioned that not a single analysis is to be found of rocks belonging to the order victorare (purely siliceous rocks, such as igneous quartz veins), though the researches of Howitt and others show that these undoubtedly exist. On the other hand, a recent paper on the igneous rocks of the Black Hills contains 19 analyses of the phonolites and tinguaites, and only four of the quantitatively far more abundant quartz-porphyries, dacites, etc. This is not intended as a criticism of the paper referred to, but simply as an illustration of the natural tendency to pay especial attention to the more interesting rock types.

A further source of possible error is to be found in the fact, which seems to be established by general experience, that the granites (using this as a field term, as proposed by Cross, Iddings, Pirsson, and Washington) occur as a general thing in masses of greater volume than the syenites, gabbros, and nephelite-syenites, though this is, to a certain extent, compensated for by the relatively greater abundance of the melaphyres (basalts and diabases) over the leucophyres (rhyolites and trachytes). At present there are no data available which permit any estimate of the quantitative relations of the volumes of the various kinds of igneous rocks, such as has been made for the thicknesses of the stratified rocks as a basis for estimating the geological time scale.

It must also be remembered that the more femic rocks are much more prone to weathering and decomposition than the more salic ones. Thus it is comparatively seldom that we find satisfactorily fresh occurrences of the peridotites or pyroxenites, the former especially being usually profoundly altered. Since analyses of altered rocks are not available for the purpose in view, many analyses of these rocks have been excluded from consideration, and this will of course affect the representative character of the data to a certain but indeterminable extent.

To what extent these sources of error balance one another it is impossible to say, though I am inclined to the view that the rarer types are more abundantly represented than is warranted by their amount in comparison with that of the more common rock types.

In any case the reliability of the statistical method increases with the number of the available data, and the large number of analyses here given would seem to justify us in the assumption that errors due to these causes may be neglected. At any rate, in the absence of any means of making appropriate corrections, we must assume that this is true, and accept the results subject to future corrections.

The objection may also be raised that another source of error lies in the rejection of many analyses on account of their poor ratings or the decomposed condition of the rock analyzed. This will affect especially the more femic rocks, where above all the iron oxides, which are especially subject to alteration by the weather, are liable not to be separately determined. That the rejection of these analyses will affect the result to some extent is undeniable, but a factor in statistical methods of even greater importance than the number of data is their quality. On this account the rejection of untrustworthy analyses, or of those which manifestly do not represent the original rock composition, is thoroughly justified. It must also be remembered that many analyses of salic rocks, as well as of the more femic ones, are rejected on account of the nonseparation of the iron oxides, etc., so that the discrepancy will not be so great as might at first sight be thought.

It is evident, however, that we may have a twofold object in view. We may study the relative quantitative distribution of the different constituents in the various magmas represented by the analyses, thereby gaining some insight into their relationships and connections, or we may use the same data in order to arrive at a knowledge of the average composition of igneous rocks. The former problem may be taken up first and discussed in a general way.

THE DISTRIBUTION OF MAGMAS.

Since the system of classification on which the analyses are arranged discriminates first on the basis of the broadest mineralogical features, then on the narrower, and finally on the chief chemical characters of the preponderant minerals, it will be as well to examine the superior analyses in Part I as to these successive points.

Taking up first the classes, which are based on the relative amounts of salic and femic minerals, they may be summarized thus:

Class.	Analyses.	Per cent.
I. Persalane	652	38.11
II. Dosalane	676	39.50
III. Salfemane	304	17.77
IV. Dofemane	63	3.68
V. Perfemane	16	0.94
	1,711	100.00

Here the great preponderance of the salic classes is most noticeable, to the first two (I and II) belonging 77.6 and to the first three (I, II, and III) 95.4 per cent of the igneous rocks of the globe, while only 4.6 per cent belong to the most femic classes, IV and V. In other words, assuming that the average composition of a division is that of its center point, quartz, the feldspars, and the lenads (feldspathoids) make up normatively 77.5 per cent of all the igneous rocks of the globe. The average rock, therefore, will have the general character of a dosalane—a point which will be discussed later. This, of course, is quite in line with the general but rather vague knowledge that quartz and the feldspars are more abundant than the dark minerals.

For the next steps we may confine ourselves for the present to the first three classes—that is, to over 95 per cent of the known igneous rocks—and discuss the more femic classes later. For the figures tabulated in detail reference may be made to the tables on pages 110–112.

In the first place, it is seen that the orders, which are based on the relative amounts of quartz, feldspars, and lenads, vary very much in size. A few are large, columbare with 125 analyses, brittannare with 378, austrare with 241, germanare with 330, and gallare with 199. In the first of these quartz and the feldspars are equal; in the next two feldspar is dominant over quartz, while in the last two the feldspars are extreme over quartz or lenads. A few orders are moderate in size, as canadare with 89 analyses, russare with 45, norgare with 63, and portugare with 56. With the exception of canadare, which is perfelic, these have feldspar dominant over lenad (feldspathoid). The others are represented each by only a score or less of analyses, and, with the exception of vaalare, are very rich in either quartz or lenads. By far the most numerous are the rocks of the quardofelic and the perfelic orders, which are represented by, respectively, 630 and 618 analyses (38.6 and 37.9 per cent). The quarfelic and the lendofelic orders come next, some distance behind, with 142 and 164 analyses, respectively (8.7 and 10 per cent), while the others make up the balance, less than 5 per cent of the total number of analyses.

Taking up for a moment the distribution of the orders in the various classes, it will be found that the persalanes are very largely quartz-bearing, the quaric orders (1 to 4) constituting 79 per cent of this class. In the dosalane class the quaric and the perfelic orders are almost equally abundant, being, respectively, 37.9 and 48.8 per cent, while in the salfemane class the quaric orders are almost unrepresented, but the perfelic form 65.5 and the lenic 30.3 per cent.

There is thus seen to be, as was to be expected, a progressive decrease in free silica, i. e., amount of quartz, as the amount of dark minerals increases. The average composition of the salic component of igneous rocks would then be that of a mixture of quartz and feldspar, the latter dominant or extreme over the former. It is of interest to note in this connection, though the bearing can not be enlarged on here, Teall's suggestion[a] that quartz and feldspar form a eutectic mixture of definite composition (dependent naturally on the alkalies present) which forms the last product of solidification in many rocks.

Taking up the rangs, which are based on the relative amounts of salic alkalies and lime, it is seen that they also vary much in size, and that there is a progressive change in character as the femic components increase, as well as with diminishing quartz.

With the exception of the docalcic and percalcic rangs, to which belong, respectively, 10.9 and 1 per cent of the analyses, the rangs are quite evenly represented. Thus the peralkalic have 20.9 per cent, the domalkalic 31.2, and the alkalicalcic 36. On the whole, then, it will be seen that while lime is abundant, the alkalies dominate over it decidedly in most rocks. In view of the large number of rocks referred at present to such groups as diorite, gabbro, diabase, and basalt, supposedly characterized by basic plagioclase (labradorite, etc.), the small representation of the docalcic rangs is very instructive. This is all the more striking when it is remembered that some of the lime here reckoned as forming normative anorthite exists modally in augite and hornblende.

Without giving the figures, it is seen that the persalane rocks are preponderantly either peralkalic or domalkalic, these two divisions being about equally large (36 and 45.3 per cent), and together constituting 81.3 per cent of the whole, while the alkalicalcic analyses form only 16.9 per cent and the docalcic and percalcic together

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[a] Teall, J. J. H., British Petrography, 1888, p. 401.

1.6 per cent. In the dosalanes the rocks become more calcic, the largest rang being the alkalicalcic one, which makes up just 50 per cent of this class, the domalkalic rangs coming next with 23.4 per cent of the analyses, the docalcic having 14.1 and the peralkalic 11.8. The salfemanes are still more calcic in character, 46.1 per cent of the analyses of this class belonging to the alkalicalcic rangs and 24 per cent to the docalcic rangs. It will also be seen that the alkalies increase in general with increase in normative quartz, i. e., silica content, while lime acts inversely in this respect. In the orders containing lenads (feldspathoids) the more alkalic rangs are naturally more numerous than those with much lime, though in the salfemanes there is a marked increase in the number of calcic rangs in these orders, which are totally absent in the persalanes.

Of the subrangs, based on the relative amounts of soda and potash, the most abundant are the dosodic and presodic, which taken together make up 55.7 per cent of the total number. Next to these are the sodipotassic, to which belong 32.4 per cent. The others are few in number, the persodic having only 5.3, the dopotassic and prepotassic 5.1, and the perpotassic the minute fraction 0.5 per cent. The great preponderance of soda over potash is thus strikingly shown, as well as the extreme rarity of truly potassic rocks. This last is of especial interest in view of the large number which are roughly called orthoclase or leucite rocks, the comparatively large amount of soda being ignored in the prevailing qualitative classifications. On the other hand, the small number of persodic rocks shows that the very notable amount of potash usually present is in general practically neglected. It will be observed, that about 1 per cent of the analyses belonging to the percalcic rangs carry so little of the alkalies that these may be neglected.

In the persalanes the sodipotassic and dosodic (including presodic) subrangs constitute about 87.6 per cent of the analyses, being present in almost equal amount (47.9 and 39.7 per cent). In the dosalanes the dosodic (including presodic) subrangs preponderate, the analyses which fall here amounting to 64.8 per cent, with 27.8 of sodipotassic, while in salfemane the dosodic subrangs dominate over all the others still more, with a percentage of 70. It is thus seen that soda increases with the femic constituents, while potash increases with the salic, though not to so great an extent. A comparison of the subrangs with the orders shows that, on the whole, potash tends to increase with increasing silica, but it is scarcely necessary to give the figures here. When the rangs are examined in regard to this point, the increase of soda relative to potash, as the rangs become more calcic, is very marked, a fact quite in accord with common knowledge.

Turning now to the last two classes, the dofemanes and the perfemanes, the data are less satisfactory on account of the much smaller number of analyses. It is obvious, however, that rocks composed largely of the polic minerals (pyroxenes and olivines) greatly outnumber those with preponderant mitic minerals (magnetite, ilmenite, titanite, etc.). The figures given by the collection would indicate that the pyroxenes are far more abundant than olivine, and this is in accord with general knowledge, though the greater tendency to decomposition of the latter mineral modifies considerably the relative figures. It is evident that alkalic femic molecules (acmite, etc.) play a very subordinate part in rock magmas, the rangs represented by analyses being permirlic without exception. The conclusion as to the practical nonexistence of normative femic alkalic molecules must, however, be modified by study of the femic components of the other three classes, in which we find acmite and sodium metasilicate (appearing modally in arfvedsonite, etc.), present to some extent, though even here very subordinate to the mirlic molecules. Miric molecules (with (MgFe)O) are much more abundant than femic calcic, the greater part of the sections of rang being permiric, only a few domiric, and still fewer calcimiric. It is obvious that this is quite in line with our knowledge of the rarity of melilite. MgO likewise preponderates very largely over FeO, since the great majority of the analyses are either permagnesic or domagnesic, there being only a bare half dozen in which FeO equals MgO.

It should be noted that in order to render this study complete the subordinate components in each class should likewise be examined. Thus the remarks on the distribution of the salic constituents should be supplemented by study of the salic portion of the analyses belonging to the dofemanes, that in the perfemanes being negligible. On the other hand, our knowledge of the distribution of the femic oxides would be greatly enlarged by study of the subordinate femic portions of the dosalane and salfemane rocks, which would add much to our too scanty data. As this is, however, a first approximation, and as such an extension would consume much time, it has not been attempted.

Looking at the matter in a general way, and, for the reasons just given, neglecting the consideration of the femic constituents and Classes IV and V, the general distribution may be illustrated thus:

If we imagine the three tables of the persalanes, dosalanes, and salfemanes to be laid one above the other in this order, the axis (if it may so be called) of rock composition will cut through the system obliquely from alaskose in columbare, through tonalose in austrare, to auvergnose in gallare. The majority of the igneous rocks, at least 65 per cent or more, would then be found in an oval or ovoid having its broader apex at alaskase and its acute in auvergnase or kedabekase. The center of gravity, so to speak, of this would lie probably in tonalase, but near monzonase, or possibly andase. This is, of course, an imaginative and somewhat crude way of stating the condition of affairs, but the examination we have made points to the conclusion that the average rock will be close to the center of gravity of the system thus roughly determined.

THE AVERAGE ROCK.

Let us now take up the question of the composition of the average rock, its determination from the data at hand, and its position in the system.

It is well known that estimates of the average composition of the igneous crust of the globe have been made by Prof. F. W. Clarke. The first of these[a] was based on 880 analyses, many of them incomplete, of both igneous and metamorphic rocks from various localities on the globe. His second[b] and third[c] estimates are based only on analyses of rocks of the United States made by the chemists of the United States Geological Survey, 680 being available for the former and 830 for the latter, with a number of separate determinations of silica, lime, and alkalies. An estimate of the average composition of the igneous rocks of Great Britain is given by Harker.[d]

These four estimates agree very closely with each other, and will all be found in tonalose, the dosodic subrang of tonalase, the alkalicalcic rang of austrare, the quardofelic order of dosalane. The close agreement of these four is quite remarkable, and their position is fully in line with the general conclusions drawn from the preceding discussion. It will be interesting to compare with them the results furnished by the much larger set of data made available in this collection.

FIRST METHOD.

There are two methods possible by which the average composition may be computed from the analyses present in the collection. One is that which was employed by both Clarke and Harker, namely, the simple addition of all the separate determinations of the different constituents and subsequent reduction to 100 parts. This is, indeed, the only method available with analyses arranged according to the older classifications, with almost total neglect of the quantitative relations of the constituents.

I have calculated the average rock in this manner from the superior and some of the inferior analyses contained in Part I of the collection. Of these 1,811 were available for the purpose. It will be seen later that this number is somewhat higher than that used for the calculation by the alternative method, the explanation being that I have here included a number in which, although they are otherwise good, the iron oxides had not been separately determined. These oxides were, of course, left out of account in the calculations. When any constituent was reported in an analysis as present in "traces," this was also neglected, as this term means generally that the constituent was supposed to be present in small amount, but was not determined.

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[a] Clarke, F. W., Bull. U. S. Geol. Survey No. 78, 1891, p. 34.

[b] Bull. U. S. Geol. Survey No. 148, 1897, p. 12.

[c] Bull. U. S. Geol. Survey No. 168, 1900, p. 14.

[d] Harker, A., Geol. Mag., Vol. XXXVI, 1899, p. 220.

It happens thus that there are fewer determinations available for the iron oxides, magnesia, lime, the alkalies, titanic acid, phosphoric acid, and manganese oxide than for silica and alumina.

As a matter of interest, and in order that the present results may be used in the future in combination with other additional data, there are given below the number of determinations used for each constituent with the sum total in each case. It may be added that none of the analyses of Part II were used, though many in which the iron oxides had not been separately determined are otherwise good, since this procedure would have unduly increased the relative proportions of the other constituents of these more femic rocks in comparison with the iron oxides, and hence have introduced serious disturbance. BaO, S, ZrO_2, and the other minor constituents are not estimated here. Clarke's figures for them are undoubtedly very close approximations to their true value, based as they are on the analyses of the United States Geological Survey, outside of which these constituents are seldom determined.

	Number of determinations.	Sum total.	Per cent.
SiO_2	1,811	105,743.22	58.239
Al_2O_3	1,811	28,606.74	15.796
Fe_2O_3	1,625	5,417.79	3.334
FeO	1,625	6,295.95	3.874
MgO	1,767	6,790.79	3.843
CaO	1,804	9,418.19	5.221
Na_2O	1,804	7,057.48	3.912
K_2O	1,794	5,670.31	3.161
H_2O+	1,704	2,433.69	1.428
H_2O-	471	170.83	0.363
TiO_2	1,139	1,183.08	1.039
P_2O_5	955	356.29	0.373
MnO	731	160.29	0.219
			100.802

These figures, calculated to 100 per cent, are given in column I in the table on page 108. In column II is given Clarke's first estimate, based on analyses from various parts of the globe; and in column III his third, based on analyses of igneous and metamorphic rocks from the United States alone. These two last are likewise calculated to 100 per cent, and his estimate for MnO is introduced.

	I	II	III
SiO_2	57.78	58.72	59.89
Al_2O_3	15.67	15.08	15.45
Fe_2O_3	3.31	3.95	2.64
FeO	3.84	3.49	3.53
MgO	3.81	4.50	4.37
CaO	5.18	5.30	4.91
Na_2O	3.88	3.21	3.56
K_2O	3.13	2.91	2.81
H_2O+	1.42	1.97[a]	1.52
H_2O-	0.36	....	0.40
TiO_2	1.03	0.55	0.60
P_2O_5	0.37	0.22	0.22
MnO	0.22	0.10	0.10
	100.00	100.00	100.00

[a] Including about 0.40 per cent of hygroscopic water.

These results, it will be evident, are very closely alike, though, as will be seen later, the average rock according to my calculations and that according to Clarke's do not fall in the same subrang of the new system of classification, I belonging in akerose, but II and III in tonalose, though all three are transitional in character. The most marked difference between them is in the silica, mine being notably lower than the other two. This is perhaps to be ascribed to the fact that I have probably included in my data more analyses than Clarke has of the more lenadic or more femic rocks, a great many of which have appeared since the date of Clarke's first estimate. The still higher silica in III, however, would seem to imply that the rocks of the United States are, on the whole, somewhat more quaric (siliceous) than those elsewhere, or possibly that more of these have been analyzed.

The somewhat higher figures for MnO in I are to be ascribed to the greater frequency of high percentages for this oxide reported in foreign analyses, the larger part of which are due to the analytical error already spoken of. Clarke's figures for this are probably nearer the truth, and if correction be made for this the amount of alumina shown in I would be correspondingly increased.

On the other hand, the alumina of I is certainly a trifle too high, since I included in my data some analyses, otherwise good, in which TiO_2 and P_2O_5 had not been determined (rating A3), and in which they have been weighed with the alumina. Some SiO_2 is also included in many of the Al_2O_3 determinations. TiO_2 is also probably somewhat too high in I.

Criticisms of this sort might be made in regard to nearly all the constituents, and corrections of a greater or less degree of probable correctness could be applied in each case. But all three results are admittedly but first approximations; and, until a sufficiently large body of excellent or good analyses is available—analyses, that is, in which all the important constituents have been determined—we can arrive at but a very rough approximation to the truth.

It must also be remembered that the foregoing estimates are based on the assumption that the number of analyses of any one kind of igneous rock is roughly proportional to its abundance in nature. This point has already been touched on above, but it is as well to reiterate it, since it is fundamental to any discussion of the composition of the average igneous rock or of that of the crust of the earth.

SECOND METHOD.

The alternative method is based on the number of analyses found in each class, order, rang, and subrang, and on the assumption that the composition of each division is that of its center point. The composition of each division is then weighted according to the number of analyses present in it, and the average composition then calculated by the same process as that of the calculation of the ideal center point of any division (cf. p. 81 et seq.). The process, though apparently complex, is in reality quite simple.

This method of procedure is, of course, open to the objection that the *average* composition of the persalanes and the perfemanes is not at the ideal center point, where the amount of the subordinate mineral group is nil—that is, in the persalanes the actual average rock would lie somewhere between its theoretical center point, where there are no femic minerals present, and the border between it and the dosalanes, where there are 12½ of femic minerals. Referring to the graphic representation of our system of subdivision,[a] it will be evident (assuming that A represents the salic portion) that this average position will be halfway between the vertical lines 8 and 7 on the left—in other words, where the femic minerals make up 6.25 per cent of the rock. The same reasoning applies, of course, to the perfemanes. In the subsequent calculations, therefore, the appropriate corrections will be made for the compositions of persalane and perfemane, each being assumed to have, respectively, 6¼ per cent of femic or salic components.

It may be observed that the following calculations, as well as those necessary to obtain the results given in tabular form for the data of the preceding discussion and the present calculations, were all carried out with the use of a seven-place table of logarithms, so that the results will be found accurate in the last decimal.

In order to arrive at the average composition, both the salic and the femic components must, of course, be considered. The distribution of these, with the composition and ratio for each center point, is given in Tables VIII, IX, X, annexed.

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[a] Cross, Iddings, Pirsson, Washington, Jour. Geol., Vol. X, 1902, p. 578; Quantitative Classification, p. 121.

These figures are used to form equations expressing the relations in each division, as has been explained in the calculation of center points, and the solution of these yields the average composition of the salic and the femic portions of the average magma, which are then combined.

TABLE VIII.—CLASSES.

Class.	Analyses.	Per cent.	Sal.	Fem.	Corrected.	
					Sal.	Fem.
I	652	38.11	38.11	....	35.73	2.38
II	676	39.50	29.63	9.87	29.63	9.87
III	304	17.77	8.88	8.89	8.88	8.89
IV	63	3.68	0.92	2.76	0.92	2.76
V	16	0.94	....	0.94	0.06	0.88
	1,711	100.00	77.54	22.46	75.22	24.78

$$\frac{\text{Sal}}{\text{Fem}} = 3.4523$$

TABLE IX.—SALIC DIVISIONS.

SALIC ORDERS.

Order.	Analyses.	Per cent.	Q.	F.	L.
1	0	0.00	....	....	....
2	12	0.74	0.56	0.18	....
3	142	8.70	4.35	4.35	....
4	630	38.60	9.65	28.95	....
5	618	37.87	....	37.87	....
6	164	10.05	....	7.54	2.51
7	42	2.57	....	1.29	1.28
8	13	0.80	....	0.20	0.60
9	11	0.67	....	....	0.67
	1,632	100.00	14.56	80.38	5.06
			− 4.28	+ 9.34	[a]+4.28=Q
			10.28	89.72	9.34=F

$$\frac{\text{F}}{\text{Q}} = \alpha = 8.7276$$

[a] Since normative quartz and lenad can not coexist, an amount of quartz sufficient to convert the lenad (which is assumed to be orthosilicate) into polysilicate feldspar is deducted from the normative quartz, and the resultant feldspar added to the main portion.

SALIC RANGS.

Rang.	Analyses.	Per cent.	K_2O+Na_2O.	CaO'.
1. Peralkalic	341	20.89	20.89	....
2. Domalkalic	509	31.19	23.39	7.80
3. Alkalicalcic	588	36.03	18.02	18.01
4. Docalcic	178	10.91	2.73	8.18
5. Percalcic	16	0.98	....	0.98
	1,632	100.00	65.03	34.97

$$\frac{K_2O+Na_2O}{CaO'} = \beta = 1.8596$$

SALIC SUBRANGS.

Subrang.	Analyses.	Per cent.	K_2O.	Na_2O.
Perpotassic	8	0.49	0.49	....
Prepotassic	9	0.55	0.39	0.16
Dopotassic	74	4.53	3.40	1.13
Sodipotassic	529	32.42	16.21	16.21
Dosodic	748	45.83	11.46	34.37
Presodic	161	9.87	2.84	7.03
Persodic	87	5.33	....	5.33
Percalcic rangs	16	0.98	34.79	64.23
	1,632	100.00		

$$\frac{Na_2O}{K_2O} = \gamma = 1.8462$$

TABLE X.—FEMIC DIVISIONS.

FEMIC ORDERS.

Order.	Analyses.	Per cent.	Pol.	Mit.
1. Perpolic	40	50.64	50.64	....
2. Dopolic	31	39.24	29.43	9.81
3. Polmitic	4	5.06	2.53	2.53
4. Domitic	4	5.06	1.26	3.80
5. Permitic	0	....	....	....
	79	100.00	83.86	16.14

$$\frac{Pol}{Mit} = \varphi = 5.1958$$

FEMIC SECTIONS OF ORDERS.

Section.[a]	Analyses.	Per cent.	P.	O.
1. Perpyric	18	22.78	22.78	....
2. Dopyric	22	27.85	20.89	6.96
3. Pyrolic	19	24.05	12.03	12.02
4. Domolic	13	16.46	4.11	12.35
5. Perolic	7	8.86	....	8.86
	79	100.00	59.81	40.19

$$\frac{{}^{b}P}{O}=\chi=1.4882$$

[a] Includes the sections of Suborder in Class IV, Order 4 (adirondackore).

[b] As will appear, this factor is not needed in the calculations which follow.

FEMIC SECTIONS OF RANGS.

Section.	Analyses.	Per cent.	(Mg, Fe) O.	CaO″.
1. Permiric	31	39.24	39.24	....
2. Domiric	39	49.37	37.03	12.34
3. Calcimiric	9	11.39	5.69	5.70
4. Docalcic	0	....	....	....
5. Percalcic	0	....	....	....
	79	100.00	81.96	18.04

$$\frac{(Mg,Fe)O}{CaO''}=\psi=4.5432$$

FEMIC SUBRANGS.

Subrang.	Analyses.	Per cent.	MgO.	FeO.
1. Permagnesic	19	24.05	24.05	....
2. Domagnesic	51	64.56	48.42	16.14
3. Magnesiferrous	5	6.33	3.17	3.16
4. Doferrous	4	5.06	1.27	3.79
5. Perferrous	0	....	....	....
	79	100.00	76.91	23.09

$$\frac{MgO}{FeO}=\omega=3.3309$$

Let q = the molecules of quartz, or of SiO_2 in quartz.
Let r = the molecules of orthoclase, or of K_2O in orthoclase.
Let s = the molecules of albite, or of Na_2O in albite.
Let t = the molecules of anorthite, or of CaO in anorthite.

Then:

$60q$ = the percentage of quartz.
$556r$ = the percentage of orthoclase.
$524s$ = the percentage of albite.
$278t$ = the percentage of anorthite.

We shall then have, for the salic portion, the equations:

$60q + 556r + 524s + 278t = 100$ (Class)
$\alpha q = 556r + 524s + 278t$ (Order)
$\beta t = r + s$ (Rang)
$\gamma r = s$ (Subrang)

The solution of these yields:

Quartz	10.28
Orthoclase	25.60
Albite	44.53
Anorthite	19.59
	100.00

These figures give the chemical composition of the salic portion of the average rock as:

SiO_2	65.89
Al_2O_3	20.56
CaO	3.95
Na_2O	5.27
K_2O	4.33
	100.00

For the femic portion of the average rock:

Let a = the molecules of wollastonite, or of CaO in wollastonite.
Let b = the molecules of enstatite, or of MgO in enstatite.
Let c = the molecules of ferrosilite, or of FeO in ferrosilite.
Let f = the molecules of magnetite, or of FeO in magnetite.
Let g = the molecules of ilmenite, or of FeO in ilmenite.

Then:

$116a$ = the percentage of wollastonite in the femic portion.
$100b$ = the percentage of enstatite in the femic portion.
$132c$ = the percentage of ferrosilite in the femic portion.
$232f$ = the percentage of magnetite in the femic portion.
$152g$ = the percentage of ilmenite in the femic portion.

We shall then have the equations:

$116a + 100b + 132c + 232f + 152g = 100$ (Class)
$116a + 100b + 132c = 232\varphi f + 152\varphi g = 83.86$ (Order[a])
$\psi a = b + c + f + g$ (Section of rang[b])
$b = \omega\ (c + f + g)$ (Subrang)
$232f = 3\ (152)\ g = 456g$ (Section of subrang[c])
$232f + 152g = 16.14$

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[a] As no olivine can exist (ex hypothese) in the average rock, the salic portion being quaric, the section of order is perpyric, and hence no equation is needed to express the ratio between pyroxene and olivine—that is, the section of order.

[b] As all the rocks which are known to belong to Classes IV and V, as shown in the collection, are permirlic, no equation for rang is needed.

[c] Magnetite and ilmenite are assumed to be present in the ratio of 3:1 exactly—that is, the section of subrang is assumed to be tildohemic and the femic portion of the average rock at the ideal center point of this division. This is based on a study of the analyses represented, and, while not absolutely exact, does not vary notably from the truth. The error involved will not be great as these constituents are present in subordinate amount, and the calculation is thus simplified.

The solution of these yields:

Wollastonite[a]	18.11
Enstatite	54.52
Ferrosilite	11.23
Magnetite	12.10
Ilmenite	4.04
	100.00

These figures give the chemical composition of the femic portion of tne average rock as:

SiO_2	47.18
Fe_2O_3	8.35
FeO	11.80
MgO	21.80
CaO	8.75
TiO_2	2.12
	100.00

If we assume that the center points of persalane and perfemane are at the extreme positions—that is, where there is respectively no femic or salic component—we combine these two results in the proportions of 77.54 salic and 22.46 femic. We shall then obtain the results given in I below. If, however, we take note of the possible objection already mentioned, that the center points of these will not be, in actual fact, at these extreme positions, but that 6.25 per cent of femic and salic components must be assumed to be present in the persalane and perfemane, respectively, we shall, on making the appropriate corrections and using the figures of Table VIII, giving the relations of the classes, obtain the results seen in II. Here the salic and femic portions are combined in the proportion of 75.22 of the former to 24.78 of the latter. It is seen that the results in each case are practically identical. In III is given the results of my first calculation, with H_2O, P_2O_5, and MnO omitted, recalculated to 100 per cent. IV shows Clarke's third estimate, likewise calculated to 100 per cent after deducting H_2O, P_2O_5, and other minor constituents.

	I.	II.	III.	IV.
SiO_2	61.69	61.26	59.21	61.25
Al_2O_3	15.94	15.47	16.04	15.81
Fe_2O_3	1.88	2.07	3.38	2.70
FeO	2.65	2.92	3.93	3.61
MgO	4.90	5.40	3.90	4.47
CaO	5.02	5.14	5.30	5.03
Na_2O	4.09	3.96	3.97	3.64
K_2O	3.35	3.25	3.21	2.87
TiO_2	0.48	0.53	1.06	0.62
	100.00	100.00	100.00	100.00

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[a] As the present purpose is not to calculate the norm, but to determine the chemical composition of the femic portion, the molecules of wollastonite are not combined with equivalents of the hypersthenes to form normative diopside.

The norms of these calculate out as follows:

	I.			II.			III.			IV.		
Quartz	7.97	7.97	77.55	7.76	7.76	75.24	7.60	7.60	76.55	11.31	11.31	77.59
Orthoclase	19.84	69.58		19.22	67.48		18.98	68.95		17.24	66.28	
Albite	34.52			33.46			33.55			30.76		
Anorthite	15.22			14.80			16.42			18.28		
Diopside	7.73	18.82	22.45	8.49	20.75	24.76	7.87	16.54	23.45	5.36	17.40	22.41
Hypersthene	11.09			12.26			8.67			12.04		
Magnetite	2.72	3.63		3.00	4.01		4.90	6.91		3.83	5.01	
Ilmenite	0.91			1.01			2.01			1.18		
	100.00			100.00			100.00			100.00		

All of these are in the dosalane class—that is, have salic minerals dominant over femic. I, II, III, however, are in germanare, or have feldspars extreme over quartz, though they all approach the border of austrare, with subordinate quartz, where IV belongs. I and II are domalkalic and belong in monzonase. III likewise is domalkalic and falls in monzonase, though the ratio of alkalies to salic lime (1.707) is very close to the border toward andase. IV, on the other hand, is alkalicalcic and belongs in the rang tonalase. All, however, are dosodic, I, II, and III being in akerose, and IV in tonalose.

It is obvious from this discussion that the composition of the average rock probably does not fall well within any one subrang of the classification, but that it is near the border and is hence transitional in character. Comparatively slight changes in the data used for its determination will therefore throw it into one or the other division of the system. Its general characteristics are clear, notwithstanding. Salic minerals will constitute about 75 per cent, and it will contain considerable normative quartz, or an excess of silica over that needed to satisfy all the bases. The alkalies and salic lime will be about equal, the former in somewhat greater amount, and soda will be markedly dominant over potash. The femic minerals will form about one-quarter of the rock, and will consist chiefly of hypersthene and diopside, the former preponderating, while the quantity of magnetite and ilmenite will be small. Chemically it will approximate to the four estimates given above.

This general position is about what we were led to expect from the former discussion, and it is worthy of note that tonalose and andose are the two subrangs most largely represented by analyses to be found in the tables. Modifications of these estimates must be made in the future, as more satisfactory data become available with increase in the number of good analyses and as some knowledge is gained in regard to the relative masses of rocks belonging to the various magmas. For the present, however, we must rest content with the approximations given above, with the understanding that they are subject to the limitations and future corrections already explained.

LIST OF ABBREVIATIONS.

In the case of words etymologically alike, but in different languages, only the English form is given. The other abbreviations used will be self-explanatory.

REFERENCES.

A	American.
A. A. A. S	American Association for the Advancement of Science.
Aarb	Aarbog.
Abh	Abhandlung.
Ac	Academy, etc.
Afh	Afhandlingar.
A. G	American Geologist (Minneapolis).
A. J. S	American Journal of Science (New Haven).
Ak	Akademie.
Ann	Annals, etc.
A. R	Annual Report.
A. R. U. S. G. S	Annual Report of the United States Geological Survey (Washington).
Att	Atti.
B	Bulletin, etc.
B. B	Beilage Band.
B. C. G. It	Bolletino del R. Comitato Geologico Italiano (Roma).
Ber	Berichte.
B. G. S. A	Bulletin of the Geological Society of America (Rochester).
Bl	Blatt.
B. M. C. Z	Bulletin of the Museum of Comparative Zoology (Cambridge).
B. S. C. G. Fr	Bulletin de la Service de la Carte Geologique de France (Paris).
B. S. G. It	Bolletino della Societa Geologica Italiana (Roma).
Btr	Beiträge.
B. U. S. G. S	Bulletin of the United States Geological Survey (Washington).
C	Commission, etc.
Cb	Centralblatt.
C. I. P. W	Cross, Iddings, Pirsson, Washington.
Cong	Congress.
C. R	Comptes Rendus.
Cte	Carte.
D	Deutsch.
Dep	Department.
Ds	Denkschrift.
Eg. Kg	Eruptivgesteine des Kristianiagebietes (Kristiania).
Erdk	Erdkunde.
Erl	Erläuterung.
Exc	Excursion.
Finl	Finland.
F. K	Földtani Közlöny (Budapest).
Fol	Folio.
Fr	France.
G	Geology, etc.
Ges	Gesellschaft.
G. F. F	Geologiske Förening in Stockholm Förhandlingar (Stockholm).
G. Kt	Geologische Karte.
G. M	Geological Magazine (London).
G. S	Geological Survey.
H	History.

Hd	Handlingar.
Imp	Imperial.
Ind	India.
In. Diss	Inaugural Dissertation.
Inst	Institute.
Int	International.
Ir	Irish.
It	Italian.
J	Journal.
Jb	Jahresbericht.
J. G	Journal of Geology (Chicago).
Jhft	Jahresheft.
K	Kaiserlich.
Kt	Karte.
L-A	Landes-Anstalt.
Mag	Magazine.
Mem	Memoir, etc.
Min	Mineralogy, etc.
Mt	Mittheilungen.
Mus	Museum.
M. U. S. G. S	Monograph of the United States Geological Survey (Washington).
N	New, etc.
Nat	Nature, etc.
Nf	Naturforscher.
Nh	Natural History.
N. J	Neues Jahrbuch für Mineralogie, Geologie, und Paläontologie (Stuttgart).
N. J. B. B	Neues Jahrbuch, Beilage Band (Stuttgart).
No	Number.
Notbl	Notizblatt.
Nw	Naturwissenschaft.
P	Petrography.
Ph	Philosophy, etc.
Phys	Physical, etc.
Pr	Proceedings, etc. Also Preussen.
Pt	Part.
Q	Quarterly.
Q. J. G. S	Quarterly Journal of the Geological Society of London.
R	Royal.
R-A	Reichs-Anstalt.
Rec	Records.
Rend	Rendiconti.
Rep	Report.
Rev	Review, etc.
Sb	Sitzungsberichte.
Sc	Science.
Soc	Society, etc.
Sp. K	Spezial Karte.
T	Transactions.
T. M. P. M	Tschermak's Mineralogische und Petrographische Mittheilungen (Wien).
Un	University etc.
Und	Undersökning, Undersögelse.
U. S	United States.
U. S. G. S	United States Geological Survey.
V	Volume.
Ver	Verein.

Vh	Verhandlungen.
Vid	Videnskab.
Wiss	Wissenschaft.
Z	Zeitschrift.
Z. D. G. G	Zeitschrift der Deutsche Geologische Gesellschaft (Berlin).
Z. K	Zeitschrift für Krystallographie (München).

MINERALS.

A	apatite subgroup (apatite, fluorite, calcite, pyrite, iron, etc.).
ab	albite.
ac	acmite.
am	akermanite.
an	anorthite.
ap	apatite.
C	corundum.
cc	calcite.
cm	chromite.
di	diopside.
en	enstatite.
F	feldspar subgroup (orthoclase, albite, anorthite).
fa	fayalite.
fo	forsterite.
fr	fluorite.
fs	ferrosilite.
H	hemic subgroup (magnetite, chromite, hematite).
hm	hematite.
hy	hypersthene.
il	ilmenite.
ir	iron (metallic).
kp	kaliophilite.
ks	potassium metasilicate.
L	lenad subgroup (leucite, nephelite, sodalite, noselite).
lc	leucite.
M	mitic subgroup (magnetite, chromite, hematite, ilmenite, titanite, perofskite, rutile).
mt	magnetite.
ne	nephelite.
no	noselite.
ns	sodium metasilicate.
O	olivine subgroup (olivine, ackermanite).
ol	olivine.
or	orthoclase.
org	organic matter.
P	pyroxene subgroup (acmite, sodium metasilicate, potassium metasilicate, diopside, wollastonite, hypersthene).
pf	perofskite.
pr	pyrite.
Q	quartz.
ru	rutile.
so	sodalite.
T	tilic subgroup (ilmenite, titanite, perofskite, rutile).
tn	titanite.
wo	wollastonite.
X	rare earths, not identified, insoluble in melted $KH(SO_4)$.
Z	zircon.

MISCELLANEOUS.

cor	corrected.
E	east.
lab	laboratory.
M	miles.
N	north.
n	near.
n. d	not determined.
p	page.
p. n. d	present, not determined.
Priv. contrib	private contribution (unpublished).
R	rang.
Ref	reference.
S	south.
sp. gr	specific gravity.
SR	subrang.
tr	trace.
W	west.

PART I.

SUPERIOR ANALYSES: CLASSIFIED ACCORDING TO THE QUANTITATIVE SYSTEM OF PETROGRAPHY PROPOSED BY CROSS, IDDINGS, PIRSSON, AND WASHINGTON.

CLASS I. PERSALANE.

RANG 1. PREALKALIC. DARGASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	80.99	12.21	0.38	0.60	0.40	0.07	0.31	2.47	2.29							99.72	
A3. III	1.350	.120	.002	.008	.010	.001	.005	.026									
2	79.69	13.49	0.14	2.08	0.66	0.46	0.08	2.71	n. d.							99.31	
A3. III	1.328	.132	.001	.030	.017	.009	.001	.028									

RANG 1. PREALKALIC. DARGASE.

1	81.43	13.70	1.58	n. d.	0.06	0.37	1.02	1.28	0.92							100.36	
A3. III	1.357	.134	.010	(.020)	.002	.007	.016	.013									
2	80.36	11.12	1.77	n. d.	0.56	0.67	1.82	2.47	1.96							100.73	
A3. III	1.339	.109	.011	(.022)	.014	.012	.030	.026									

RANG 1. PREALKALIC. DARGASE.

1	83.59	5.42	trace	trace	trace	3.44	5.33	1.37	0.76							99.91	
A3. III	1.393	.053	—	—	—	.062	.086	.015									
2	76.93	14.35	0.85	0.23	0.12	1.29	2.71	0.60	1.01		1.71					99.80	
A3. III	1.282	.141	.005	.003	.003	.023	.043	.006									

RANG 2. ALKALICALCIC.

1	75.05	13.16	1.63	3.07	0.38	1.80	0.92	2.58	1.57							100.16	2.468
A3. III	1.251	.129	.010	.043	.010	.032	.014	.027									18°
2	72.03	14.87	3.11	2.21	1.37	1.41	0.78	2.32	2.02					trace		100.12	2.523
A3. III	1.201	.146	.020	.030	.034	.025	.013	.024						—			20°
3	80.55	9.87	2.13	n. d.	0.81	2.21	0.42	2.43	1.06							99.48	
A3. III	1.343	.096	.013	(.026)	.020	.039	.007	.025									

RANG 2. ALKALICALCIC.

1	77.55	14.61	n. d.	2.21	0.32	2.12	1.43	1.62	n. d.				0.57	0.08		100.51	
A3. III	1.293	.143	—	.030	.008	.038	.022	.017					.004	.001			

RANG 2. ALKALICALCIC.

1	75.71	13.73	n. d.	4.51	0.45	1.47	0.96	0.61	2.00							99.44	2.385
A4. IV	1.262	.134	—	.062	.011	.027	.015	.006									
2	82.45	8.36	2.54	n. d.	0.32	1.73	2.36	0.78	0.23		1.04		0.15			99.96	2.648
A3. III	1.374	.082	.015	(.060)	.006	.030	.039	.008					.001				

SUBCLASS I. Q+F+L EXTREME OVER C+Z.

ORDER 2. DOQUARIC. BELGARE.

SUBRANG 1. PREPOTASSIC.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 68.8 or 14.5 ab 2.6 an 0.3 C 8.9	hy 1.9 mt 0.5	Heidenstein, Schwarzwald, Baden.	Bunsen's Laboratory.	A. Schmidt, cf. N. J., 1889, I, p. 95.	Porphyry.	
	Q 65.4 or 15.6 ab 0.5 an 2.5 C 9.6	hy 5.5 mt 0.2	Mount Bischoff, Tasmania.	H. Sommerlad.	A. v. Groddeck, Z. D. G. G., XXXIX, p. 80, 1887.	Porphyry.	

SUBRANG 2. SODIPOTASSIC.

	Q 68.8 or 7.2 ab 8.4 an 1.9 C 10.0	hy 2.9	Pine Lake, Ontario.	N. N. Evans.	F. D. Adams, B. G. S. A., IX, p. 169, 1898.	Nodule in granite.	
	Q 56.6 or 14.5 ab 15.7 an 3.3 C 4.2	hy 4.4	Grainsgill, Carrock Fell, England.	L. J. Spencer.	A. Harker, Q. J. G. S., LI, p. 141, 1895.	Greisen.	

SUBRANG 3. PRESODIC.

	Q 60.3 or 8.3 ab 19.9	ns 2.9 wo 7.1	Berkeley, California.	C. Palache.	C. Palache, B. Dep. G. Un. Cal., I, p. 67, 1894.	Soda-rhyolite.	Al_2O_3 low?
	Q 56.3 or 3.3 ab 22.5 an 6.4 C 7.0	hy 0.3 mt 0.7 hm 0.3	Schwarzthal, Windgälle Mountains, Switzerland.	Serda.	C. Schmidt, N. J. B. B., VI, p. 432, 1886.	Porphyry.	Schistose. Not fresh.

SUBRANG 1. PREPOTASSIC.

	Q 53.9 or 15.0 ab 7.3 an 8.9 C 5.7	hy 5.4 mt 2.3	Angera, Lago Maggiore, Italy.	L. Ricciardi.	L. Ricciardi, Att. Ac. Gioen., XVIII, p. 9, 1885.	Porphyry.	
	Q 53.1 or 13.3 ab 7.8 an 7.0 C 8.6	hy 4.7 mt 4.6	Invorio Superiore, Lago d'Orta, Italy.	L. Ricciardi.	L. Ricciardi, Att. Ac. Gioen., XVIII, p. 21, 1885.	Porphyry.	
	Q 61.6 or 13.9 ab 3.7 an 10.8 C 2.6	hy 5.5	Garrarus, County Waterford, Ireland.	Jones and Robinson.	F. W. C. Reed, Q. J. G. S., LVI, p. 679, 1900.	Felsite.	

SUBRANG 2. SODIPOTASSIC.

	Q 56.7 or 8.5 ab 11.5 an 10.6 C 6.7	hy 4.8	Eruption 1888–89, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 107, 1892.	Quartz-andesite.	Bomb. P_2O_5 high?

SUBRANG 3. PRESODIC.

	Q 60.5 or 3.3 ab 7.9 an 7.5 C 8.8	hy 9.4	Alausi, Ecuador.	J. Siemiradzki.	J. Siemiradzki, N. J., B. B., IV, p. 209, 1886.	Dacite.	
	Q 59.6 or 4.5 ab 20.4 an 8.3 C 0.5	hy 4.7	Oberhunden, Westphalia.	Bömer.	O. Mügge, N. J., B. B., VIII, p. 568, 1893.	Quartz-keratophyre.	Not fresh.

CLASS I. PERSALANE—Continued.

RANG 3. PRECALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	79.92	3.61	3.38	n. d.	0.04	2.45	0.30	1.19	7.38					trace		100.27	
A4. IV	1.332	.035	.021	.042	.001	.044	.005	.013						—			

CLASS I. PERSALANE.

RANG 1. PERALKALIC. ALASKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	78.04	11.98	0.23	0.60	0.04	0.62	0.24	6.83	1.41							100.01	
A5. III	1.301	.117	.001	.008	.001	.011	.004	.072									

RANG 1. PERALKALIC. ALASKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	79.75	10.47	0.64	0.92	0.13	0.15	1.38	6.01	0.60	0.08		0.15	trace	trace	0.06	100.37	
A1. I	1.329	.103	.004	.013	.003	.003	.022	.064				.002	—	—			
2	78.83	10.88	1.63	n. d.	0.35	0.22	2.13	5.31	0.32							99.67	
A3. III	1.314	.106	.010	.009	.009	.004	.034	.057									
3	76.10	12.96	0.65	0.09	0.14	0.12	2.38	6.50	0.48	0.17	none	0.07	0.02	trace		99.65	
A2. II	1.268	.127	.004	.001	.004	.002	.038	.069				.001	—	—			
4	75.39	13.65	0.38	0.18	0.15	0.51	1.84	6.81	1.13			trace	trace	0.14		100.18	
A2. II	1.257	.134	.002	.003	.004	.009	.029	.072				—	—	.002			
5	74.40	14.43	0.22	0.89	0.07	0.58	1.78	6.56	0.92	0.15		0.12	0.22	trace	trace	100.38	
A1. I	1.240	.142	.001	.012	.002	.010	.028	.070				.001	.002	—			
6	73.23	12.73	0.99	0.16	0.22	0.61	1.91	5.17	4.51	0.53		0.09	0.02	trace	0.02	100.19	
A1. I	1.221	.125	.006	.002	.006	.010	.030	.055				.001	—	—			
7	74.69	16.21	trace	1.16	0.48	0.28	1.18	3.64	1.23					0.58		99.55	2.64
B3. IV	1.245	.159	—	.017	.012	.006	.019	.038						.008			
8	76.43	11.69	0.57	0.62	0.30	trace	1.62	6.96	0.84		0.08	trace	0.09			99.30	2.609
B3. III	1.274	.114	.004	.008	.008	—	.026	.074				—	.001				
9	76.06	11.38	2.23	n. d.	0.12	0.58	1.17	7.27	0.90			0.12				99.81	2.613
A3. III	1.268	.111	.014	(.028)	.005	.010	.019	.078				.002					
10	75.27	12.92	1.89	n. d.	0.47	0.32	1.14	6.48	0.61				trace	0.29		100.63	2.66
A3. III	1.255	.126	.012	(.026)	.012	.005	.018	.069					—	.004			
11	76.94	12.20	2.34	n. d.	0.32	0.57	1.47	4.65	1.15							99.64	2.451 17°
A4. IV	1.282	.120	.014	(.028)	.008	.010	.024	.050									
12	75.30	11.40	5.40	n. d.	0.60	0.75	1.45	6.13	—			trace				101.08	2.67
B4. V	1.255	.112	.034	(.008)	.015	.013	.023	.065				—					

ORDER 2. DOQUARIC. BELGARE—Continued.

SUBRANG 1. PREPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 66.0 or 7.2 ab 2.6 an 10.3 di 1.7 hy 4.8	Between Livan and Üskü, Persia.	V. Steinecke.	V. Steinecke, Z. Ges. Nw. Halle, VI, p. 70, 1887.	Pitchstone.	

ORDER 3. QUARFELIC. COLUMBARE.

SUBRANG 1. PERPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 48.9 or 40.0 ab 2.1 an 3.1 C 3.1 hy 1.0 mt 0.2	Riggenbach Thal, Schwarzwald, Baden.	Bunsen's Laboratory.	A. Schmidt, cf. N. J., 1889, I, p. 95.	Porphyry.	

SUBRANG 2. DOPOTASSIC. MAGDEBURGOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 0.05 S none NiO none SrO trace Li_2O trace	Q 47.8 or 35.6 ab 11.5 an 0.8 C 1.4 hy 1.4 mt 0.8	Near Blowing Rock, Watauga County, North Carolina.	W. F. Hillebrand.	A. Keith, B. U. S. G. S., 168, p. 52, 1900.	Quartz-porphyry.	
	Q 43.9 or 31.7 ab 17.8 an 1.1 C 1.1 hy 2.9	Pine Lake, Ontario.	N. N. Evans.	F. D. Adams, B. G. S. A., IX, p. 169, 1898.	Granite.	
NiO none	Q 37.1 or 38.4 ab 19.9 an 0.6 C 1.8 hy 0.4 mt 0.2 hm 0.5	Felch Mountain, Michigan.	H. N. Stokes.	H. L. Smith, M. U. S. G. S., XXXVI, p. 389, 1899.	Granite.	
	Q 37.7 or 40.0 ab 15.2 an 2.5 C 2.3 hy 0.6 mt 0.5	Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 324, 1896.	Rhyolite.	
F 0.04 SrO none Li_2O trace	Q 37.3 or 38.9 ab 14.7 an 2.8 C 3.5 hy 1.7 mt 0.2	Currant Creek Canyon, Pike's Peak, Colorado.	W. F. Hillebrand.	E. B. Mathews, B. U. S. G. S., 148, p. 160, 1897.	Granite.	
SrO none Li_2O trace	Q 40.7 or 31.1 ab 15.7 an 2.8 C 3.0 hy 0.6 mt 0.5 hm 1.1	Buena Vista Peak, Amador County, California.	W. F. Hillebrand.	H. W. Turner, J. G., III, p. 407, 1895.	Rhyolite.	Also in 17 A.R.U.S.G.S., I, p. 721, 1896.
Li_2O 0.10	Q 51.8 or 21.1 ab 10.0 an 1.4 C 9.9 hy 3.4	Carn Brea Hill, Redruth, Cornwall.	Phillips.	J. J. H. Teall, Brit. Petrog., p. 314, 1888.	Granite.	Al_2O_3 high? Alkalies low?
SO_3 0.10	Q 39.7 or 41.1 ab 13.6 C 1.4 hy 1.3 mt 0.9	Alvensleben, n. Magdeburg, Saxony.	Hampe.	F. Klockmann, Jb. Pr. G. L-A., XI, p. 192, 1892.	Quartz-porphyry.	
	Q 38.1 or 43.4 ab 10.0 an 2.8 C 0.4 hy 4.0	Klinzerberg, n. Magdeburg, Saxony.	Bodländer.	F. Klockmann, Jb. pr. G. L-A., XI, p. 180, 1892.	Quartz-porphyry.	
B_2O_3 1.24	Q 41.2 or 38.4 ab 9.4 an 1.4 C 3.5 hy 4.4	Rican, n. Prague, Bohemia.	K. Preis.	F. Katzer, Jb. Wien. G. R-A., XXXVIII, p. 411, 1898.	Tourmaline-pegmatite.	3 meters from contact.
	Q 47.5 or 27.8 ab 12.6 an 2.8 C 3.7 hy 4.5	Arona, Lago Maggiore, Piedmont.	L. Ricciardi.	L. Ricciardi, Att. Acc. Gioen. Catania, XVIII, p. 7, 1885.	Porphyry.	
	Q 36.7 or 36.1 ab 12.0 an 3.6 C 1.1 hy 11.4	St. Thomas Mount, Madras, India.	P. C. Roy.	T. H. Holland, Mem. G. S. India, XXVIII, p. 142, 1900.	Charnockite (hypersthene-granite).	Sum high.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	77.28	11.24	1.74	none	0.21	trace	3.10	4.55	1.16		0.17	trace	0.02			99.47	
A2. II	1.288	.110	.011	—	.005	—	.050	.049				—	—				
2	73.85	13.15	3.27	0.36	0.32	0.82	2.29	5.42	0.71				0.06	0.09		100.34	
A2. II	1.231	.129	.020	.005	.008	.014	.037	.058					—	.001			
3	79.57	11.41	0.20	0.70	trace	0.21	3.46	3.52	0.61	0.18		0.11	trace	none	0.05	100.02	
A1. I	1.326	.112	.001	.010	—	.003	.056	.037				.001	—	—	—		
4	74.62	10.01	3.85	1.72	0.33	2.43	3.33	3.38	0.24							99.91	
A3. III	1.244	.098	.024	.024	.008	.043	.053	.036									
5	77.05	12.84	0.56	0.14	trace	0.57	2.81	5.52	0.48	0.22	none	0.12	none	none	none	100.31	
A1. I	1.284	.126	.004	.002	—	.010	.045	.059				.002	—	—	—		
6	76.87	12.52	0.67	none	0.09	0.49	2.47	5.78	0.52	0.25		0.11	0.05			99.82	
A2. II	1.281	.122	.004	—	.002	.009	.040	.062				.001	—	—	—		
7	75.52	14.11	1.74	0.08	0.10	0.78	3.92	3.63	0.39			none		none		100.38	
A1. I	1.255	.138	.011	.001	.003	.014	.063	.039				—		—			
8	77.03	12.00	0.76	0.86	0.04	0.80	3.21	4.92	0.30	0.14		0.13	trace	trace	trace	100.55 0.15	
A1. I	1.284	.118	.005	.012	.001	.014	.051	.053				.002	—	—	—	100.40	
9	77.02	11.63	0.32	1.09	0.14	1.24	2.85	5.21	0.35					trace		99.85	
A3. III	1.284	.114	.002	.015	.004	.022	.046	.056									
10	73.11	13.16	0.62	0.23	0.19	0.54	2.85	5.10	4.05					0.14		99.99	
A3. III	1.219	.129	.004	.003	.005	.010	.046	.055						.002			
11	77.33	12.55	0.91	n. d.	0.10	0.17	3.19	4.80	0.53	0.15	none	0.09	trace	trace	trace	99.82	
A2. II	1.289	.123	.006	(0.10)	.003	.003	.051	.051				.001	—	—	—		
12	75.84	13.38	1.45	n. d.	0.10	0.07	3.33	4.73	0.71	0.18	none	0.09	trace	trace	trace	99.88	
A2. II	1.264	.131	.009	(0.18)	.003	.002	.053	.050				.001	—	—	—		
13	77.68	11.81	0.72	0.51	0.18	0.72	2.96	5.00	0.27	0.04		0.14	0.10	trace		100.13	
A2. II	1.295	.116	.005	.007	.005	.013	.048	.053				.002	.001	—			
14	74.24	14.50	1.27	0.67	0.25	0.11	3.00	3.66	2.04			0.20	0.07	0.06	0.18	100.28	
A1. I	1.237	.142	.008	.008	.006	.002	.048	.039				.003	.001	.001	.001		
15	71.33	11.18	3.98	1.45	0.88	2.10	3.51	3.49	0.92		0.74	0.12	trace	0.32	0.03	100.16	
A1. I	1.189	.100	.025	.020	.022	.038	.056	.037				.002	—	.005	—		
16	81.08	11.45	n. d.	0.21	trace	0.46	2.30	3.64	0.60							99.74	
A3. III	1.351	.112	—	.003	—	.009	.037	.039									
17	74.54	14.86	2.53	0.23	trace	0.29	3.49	3.73	0.87					trace		100.54	2.66
A3. III	1.242	.146	.016	.003	—	.005	.056	.039						—			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODIPOTASSIC. ALASKOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 41.3 or 27.2 ab 26.2 C 1.1	hy 0.5 hm 1.7	Fox Islands, Maine.	Magruder and Jones.	G. O. Smith, Geol. of Fox Islands, In. Diss., 1896, p. 51.	Aporhyolite.	
		Q 37.5 or 32.2 ab 19.4 an 3.9 C 2.0	hy 0.8 mt 1.2 hm 2.4	Monterey, Franklin County, Pennsylvania.	L. G. Eakins.	G. H. Williams, B. U. S. G. S., 148, p. 81, 1897.	Quartz-porphyry.	Not described.
SrO	trace	Q 45.2 or 20.6 ab 29.3 an 0.8 C 1.7	hy 1.1 mt 0.2	Sam Christian Mine, Montgomery County, North Carolina.	W. F. Hillebrand.	J. S. Diller, A. J. S., VII, 341, 1899.	Rhyolite.	
		Q 39.0 or 20.0 ab 27.8 an 2.5	di 1.8 wo 3.1 mt 5.6	Waushara, Wisconsin.	S. Weidman.	S. Weidman, Bull. III, G. Nh. S. Mich., p. 2, 1898.	Granite.	
S SrO	none none	Q 38.4 or 32.8 ab 23.6 an 2.8 C 1.2	mt 0.4 hm 0.3	Nettie Mine, Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G. VII, p. 739, 1899.	Aplite.	
		Q 38.9 or 34.5 ab 21.0 an 2.5 C 1.1	hy 0.2 mt 0.7	Nettie Mine, Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899	Aplite.	
FeS_2	0.11	Q 36.7 or 21.7 ab 33.0 an 3.9 C 2.2	hy 0.3 mt 0.2 hm 1.6	Obsidian Cliff, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 7 A. R. U. S. G. S., p. 282, 1888.	Obsidian.	
F Li_2O	0.36 trace	Q 37.5 or 29.5 ab 26.7 an 3.9	mt 1.7	Sentinel Point, Pikes Peak, Colorado.	W. F. Hillebrand.	E. B. Mathews, B. U. S. G. S., 150, p. 177, 1898.	Biotite-granite.	
		Q 37.3 or 31.1 ab 24.1 an 3.3	di 2.7 hy 1.7 mt 0.5	Platte Canyon, Jefferson County, Colorado.	H. N. Stokes.	E. B. Mathews, B. U. S. G. S., 148, p. 179, 1897.	Granite.	
		Q 35.3 or 30.6 ab 24.1 an 2.8 C 1.8	hy 0.5 mt 0.9	Rosita, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., 324, 1896.	Pitchstone.	
SrO Li_2O	trace trace	Q 40.1 or 28.4 ab 26.7 an 0.8 C 1.8	hy 0.2 hm 0.9	Tordrillo Mountains, Alaska.	H. N. Stokes.	J. E. Spurr, A. G., XXV, p. 231, 1900.	Alaskite.	
SrO Li_2O	trace trace	Q 38.3 or 27.8 ab 27.8 an 0.6 C 2.7	hy 0.3 hm 1.5	Tordrillo Mountains, Alaska.	H. N. Stokes.	J. E. Spurr, A. G., XXV, p. 229, 1900.	Tordrillite.	
		Q 39.4 or 29.5 ab 25.2 an 3.6	hy 0.7 mt 1.2	Pyramid Peak, Eldorado County, California.	G. Steiger.	W. Lindgren, A. J. S., III, p. 306, 1897.	Granitite.	
SO_3 SrO Li_2O	0.03 trace none	Q 42.0 or 21.7 ab 25.2 an 0.6 C 5.4	hy 0.6 mt 1.9	Near Willow Lake, Plumas County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 192, 1897.	Rhyolite.	
ZrO_2 Cl FeS_2 CoO Cu and Pb	none 0.09 0.04 none none	Q 33.8 or 20.6 ab 29.3 an 1.9	di 4.8 hy 1.0 mt 4.6 hm 0.8	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. Contrib.	Quartz-porphyry.	
		Q 52.4 or 21.7 ab 19.4 an 2.5 C 2.8	hy 0.4	Berufiordskard, Iceland.	C. W. Schmidt.	C. W. Schmidt, Z. D. G. G., XXXVII, p. 776, 1885.	Liparite.	
Li_2O	trace	Q 39.7 or 21.7 ab 29.3 an 1.4 C 4.7	mt 0.7 hm 2.0	Botallack, Cornwall.	Phillips.	J. J. H. Teall, Brit. Petr., p. 314, 1888.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
18	73.00	15.20	1.86	n. d.	1.01	0.56	3.44	4.14	1.25							100.46	
A3. III	1.233	.149	.012	(.024)	.025	.010	.055	.044									
19	77.20	12.11	1.61	n. d.	trace	0.14	3.87	4.07	0.36			0.10				99.46	
A3. III	1.287	.119	.010	(.020)	—	.002	.062	.043				.001					
20	76.73	12.70	1.38	n. d.	0.12	0.50	3.17	4.55	0.57			0.24				99.96	
A2. II	1.279	.125	.009	(.018)	.003	.009	.051	.048				.003					
21	76.26	12.06	1.14	0.66	0.06	0.69	2.89	4.50	0.71	—		0.40		0.25		99.62	
A2. II	1.271	.118	.007	.009	.002	.012	.047	.048				.005		.004			
22	72.93	13.87	1.94	0.79	0.51	0.74	3.68	3.74	1.18	—		0.50		0.14		100.02	
A2. II	1.216	.136	.012	.011	.013	.013	.060	.039				.006		.002			
23	75.44	10.99	2.33	0.93	0.25	1.24	2.72	4.98	1.06					0.47		100.41	
A3. III	1.257	.108	.014	.013	.006	.022	.043	.054						.007			
24	71.01	11.86	3.92	2.34	0.26	1.24	2.59	3.02	0.93		0.09		0.85			99.89	
A2. II	1.184	.116	.024	.032	.007	.022	.042	.032					.006				
25	76.56	12.75	0.21	0.61	0.14	0.46	3.38	4.85	0.68							99.64	
A3. III	1.276	.125	.001	.008	.004	.008	.055	.052									
26	74.82	13.63	0.97	0.83	0.08	0.87	3.03	4.81	0.82							99.86	
A3. III	1.247	.134	.006	.011	.002	.006	.048	.051									
27	77.68	12.95	0.96	0.37	0.21	.030	3.18	4.37	0.71				trace			100.73	
A3. III	1.295	.127	.006	.005	.005	.005	.051	.047					—				
28	77.48	11.84	0.57	1.63	0.27	0.43	2.48	3.73	1.56				0.23			100.22	
A2. II	1.291	.116	.004	.022	.007	.008	.040	.039					.002				
29	76.44	13.78	0.97	0.07	0.34	0.75	2.76	3.50	0.38	0.33			0.51			100.08	
A2. II	1.274	.135	.006	.001	.009	.013	.044	.037					.004				
30	75.25	13.36	0.28	1.23	0.02	0.65	2.91	4.55	0.64				0.18			99.07	
B3. IV	1.254	.131	.002	.017	.001	.011	.047	.049					.001				
31	76.10	15.95	trace	none	0.11	0.23	2.90	3.27	1.16							99.72	2.673
A3. III	1.268	.156	—	—	.003	.004	.047	.035									
32	77.59	12.75	0.67	none	0.16	0.04	2.56	3.99	1.54			0.63	trace	trace	0.10	100.10	2.511
A2. II	1.293	.125	.004	—	.004	.001	.041	.042				.008	—	—	.001		

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODIPOTASSIC. ALASKOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 34.2 or 24.5 ab 28.8 an 2.8 C 4.1	hy 5.6	Ile Longue, Brittany, France.	Not stated.	C. Barrois, Guide Exc., VIII, Cong. G., VII, p. 21, 1900.	Aplite.	
		Q 38.0 or 23.9 ab 32.5 an 0.6 C 1.2	hy 2.7	Kroftkollen, Drammen, Norway.	R. Mauzelius.	W. C. Brögger, Z. K., XVI, p. 77, 1890.	Quartz-porphyry.	
		Q 38.2 or 26.7 ab 26.7 an 2.5 C 0.7	hy 2.7	Hennum, Norway.	R. Mauzelius.	W. C. Brögger, Z. K., XVI, p. 77, 1890.	Aplitic granophyre.	
		Q 40.5 or 26.7 ab 24.6 an 3.3	hy 0.2 mt 0.9 il 0.8 hm 0.4	Sundsvall, Sweden.	H. Santesson.	P. J. Holmquist, Afh. Sv. G. Und., No. 181, p. 45, 1899.	Granite-porphyry.	Dried at 110°.
		Q 35.0 or 21.7 ab 31.4 an 3.6 C 2.5	hy 1.3 mt 1.2 hm 1.1 il 0.9	Rödö, Sweden,	H. Santesson.	P. J. Holmquist, Afh. Sv. G. Und., No. 181, p. 14, 1899.	Rapakiwi granite.	Dried at 110°.
		Q 38.2 or 30.0 ab 22.5 an 3.1	di 1.3 wo 0.6 mt 3.2	Kastagropen, n. Karlshamn, Scania, Sweden.	H. Santesson.	H. Bäckström, K. Sv. Vet. Ak. Handl., XXIX, p. 18, 1897.	Granulite (crushed granite).	
Cl F	0.88 0.93	Q 43.3 or 17.8 ab 22.0 an 0.6 C 4.2	hy 1.8 mt 5.6 ap 2.0	Block on Dagö Island, Esthonia, Russia.	Schridde.	J. J. Sederholm, T. M. P. M., XII, p. 21. 1891.	Rapakiwi granite.	Cl high? F high?
		Q 36.4 or 28.9 ab 28.8 an 2.2 C 1.0	hy 1.4 mt 0.2	Grosssachsener Thal, Baden.	Phookan.	K. Futterer, Mit. Bad. G. L-A., II, p. 41, 1893.	Granite.	
		Q 38.0 or 28.4 ab 25.2 an 1.7 C 3.0	hy 0.9 mt 1.4	Standenbühl, n. Heiligkreuz, Baden.	Beckmann.	K. Futterer, Mit. Bad. G. L-A., II, p. 41, 1893.	Granite.	
		Q 41.5 or 26.1 ab 26.7 an 1.4 C 2.5	hy 0.5 mt 1.4	Waterfall, Tryberg, Schwartzwald, Baden.	L. McCay.	G. H. Williams, N. J. B. B., II, p. 609, 1883.	Quartz-porphyry.	
F Li_2O	trace trace	Q 46.6 or 21.7 ab 21.0 an 2.2 C 3.0	hy 3.1 mt 0.9	Epprechtstein, Fichtelgebirge, Bavaria.	A. Böttger.	F. v. Sandberger, Sb. Münch. Ak., XVIII, p. 466, 1888.	Lithionite-granite.	
FeS_2	0.25	Q 46.8 or 20.6 ab 23.2 C 5.4	hy 0.8 mt 0.2 hm 0.8 ap 1.3	Lindenstein, Hesse.	R. Marzahn.	Chelius and Klemm, Erl. G. Kt., Hessen, IV, p. 42, 1896.	Granite.	
Li_2O	trace	Q 38.5 or 27.2 ab 24.6 an 3.1 C 2.4	hy 2.0 mt 0.5	Schneeberg, Fichtelgebirge, Bavaria.	A. Böttger.	F. v. Sandberger, Sb. Münch. Ak., XVIII, p. 466, 1888.	Granite.	
		Q 46.4 or 19.5 ab 24.6 an 1.1 C 7.1	hy 0.3	Omeo, Victoria, Australia.	A. W. Howitt.	A. W. Howitt, T. R. Soc. Vict., XXIV, p. 110, 1888.	Muscovite-granite.	Dried at 100°. H_2O—0.18.
SO_3	0.07	Q 47.3 or 28.4 ab 21.5 an 0.3 C 4.2	hy 0.4 hm 0.7 ru 0.6	Omahu, Hauraki, Auckland Province, New Zealand.	P. Holland.	P. Holland, Q. J. G. S., LV, p. 467, 1899.	Rhyolite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	75.10	13.77	0.61	1.37	0.09	0.68	3.83	3.83	0.65			none	none	trace		99.83	
A1 I	[illegible]	.135	.004	.019	.002	.012	.061	.035				—	—	—			
2	74.31	14.83	1.00	trace	0.47	0.81	4.38	2.72	0.92			none	trace	none		99.99	
A1 I	[illegible]	.145	.007		.012	.014	.071	.029				—	—	—			
3	76.00	14.88	0.63	0.30	0.06	0.19	3.32	2.77	1.42	0.20	none	0.04	0.11	trace	trace	99.94	
A2 I	[illegible]	.146	.004	[illegible]	[illegible]	.003	.054	.030				—	.001	—	—		
4	73.62	12.22	2.08	4.03	0.26	0.84	3.37	2.57	0.40							99.09	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.027									
5	74.89	13.33	1.33	n.d.	0.33	0.48	3.70	2.14	1.18					0.22		99.43	2.72
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.022						.003			
6	74.30	12.48	2.13	n.d.	1.08	0.60	[illegible]	1.32	2.42							99.35	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
7	72.78	14.13	0.17	n.d.	trace	0.82	4.51	2.48	4.33							99.26	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]									

RANG [illegible] PERALKALIC. ALASKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	77.82	11.62	3.57	0.80	[illegible]	0.62	[illegible]	0.99	0.65			0.54		0.70		100.51	
A2 II	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]		[illegible]			
2	80.42	9.22	1.22	0.62	[illegible]	0.86	4.50	0.62	0.86	-	0.98	0.06	0.06			99.67	2.652
A2 II	1.340	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	—				
3	88.57	8.01	2.04	[illegible]	trace	0.50	4.53	0.16	[illegible]							99.67	2.624
A3 III	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]									

RANG 2. DOMALKALIC. ALSBACHASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	76.41	14.42	0.48	0.74	0.24	1.43	0.65	5.88	1.02		.40					100.65	
A3 III	[illegible]	.141	[illegible]	.010	[illegible]	.025	[illegible]	[illegible]									
2	78.07	11.78	2.80	n.d.	0.39	2.02	1.10	[illegible]	2.24							99.82	
A4 IV	[illegible]	[illegible]	[illegible]	[illegible]	.010	[illegible]	[illegible]	[illegible]									
3	73.15	16.74	0.78	n.d.	0.21	0.90	1.13	4.58	2.58							100.92	2.486
A3 III	1.219	.164	[illegible]	.010	[illegible]	.016	[illegible]	[illegible]									
4	72.68	15.62	0.95	n.d.	trace	0.63	1.17	4.30	2.90							100.02	2.229
A3 III	1.211	.153	.006	.032	—	.011	.019	.046									
5	70.50	17.62	1.74	n.d.	trace	1.90	0.80	5.10	1.61							99.84	2.392
A3 III	1.177	.173	.011	.022	—	.035	.013	.055									

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 4. DOSODIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.29 Li_2O 0.02	Q 38.2 hy 2.2 or 19.5 mt 0.9 ab 32.0 an 3.3 C 2.8	Madison Plateau, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 426, 1899.	Rhyolite.	
SO_3 0.24 Li_2O 0.02	Q 36.1 hy 1.2 or 16.1 hm 1.1 ab 37.2 an 3.9 C 3.3	Echo Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 65, 1899.	Dacite-porphyry.	
SO_3 trace Cl trace F trace	Q 44.6 mt 0.2 or 16.7 hm 0.5 ab 29.3 an 0.8 C 5.8	Grizzly Hill, Plumas County, California.	H. N. Stokes.	H. W. Turner, 17th A. R. U. S. G. S., I, p. 721, 1896.	Muscovite-granite.	
	Q 39.3 hy 6.4 or 14.0 mt 3.0 ab 30.4 an 1.7 C 3.0	Pine Mountain, South Mountain, Pennsylvania.	C. H. Henderson.	C. H. Henderson, T. A. Inst. Min. Eng., XII, p. 90, 1884.	Rhyolite.	
	Q 41.9 hy 3.2 or 12.2 ab 32.2 an 2.5 C 6.2	Crosby, Isle of Man.	Holland?	Dickson and Holland, Pr. Liverp. G. Soc., VI, Pt. I, p. 126, 1889.	Microgranite.	
	Q 34.9 hy 6.4 or 8.9 ab 41.9 an 3.1 C 1.5	St. George Monastery, Crimea, Russia.	A. Lagorio.	A. Lagorio, Exc. VII Cong. G. Int., XXXIII, p. 27, 1897.	Keratophyre.	
	Q 35.8 or 14.5 ab 37.7 an 3.9 C 2.8	Marekanka River, Kamchatka.	P. Wenjukoff.	P. Wenjukoff, cf. N. J., 1891, I, 281.	Perlite.	

SUBRANG 5. PERSODIC. WESTPHALOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 37.7 hy 2.0 or 5.6 mt 1.4 ab 48.7 hm 0.4 an 3.1 il 0.6	Gubben, n. Roddö, Sweden.	H. Santesson.	P. J. Holmquist, Afh. Sver. G. Und. No. 181, p. 83, 1899.	Granite.	Dried at 110°.
SO_3 0.04 Org. 0.07	Q 50.2 di 0.7 or 3.3 hy 0.6 ab 37.7 mt 1.9 an 3.3	Near Wibbeke, Westphalia.	Jacobs.	O. Mügge, N. J. B. B., VIII, p. 632, 1893.	Quartz-keratophyre.	Dried at 105°. SO_3 from FeS_2.
S trace	Q 54.6 di 1.3 or 1.1 hy 2.8 ab 37.7 an 1.1	Hohlinden Quarry, Wiebelsaal, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 616, 1893.	Quartz-keratophyre.	Dried at 105°.

SUBRANG 2. DOPOTASSIC. MIHALOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 54.6 hy 1.5 or 22.8 mt 0.7 ab 4.7 an 7.0 C 6.7	Käserngrat, Windgälle Mountains, Switzerland.	C. Schmidt.	C. Schmidt, N. J. B. B., IV, p. 432, 1886.	Porphyry.	Not fresh.
	Q 34.4 di 2.9 or 40.0 hy 3.3 ab 10.0 an 6.7	McClellan Peak, Washoe, Nevada.	F. A. Gooch.	Hague and Iddings, B. U. S. G. S., 17, p. 33, 1885.	Rhyolite.	Near dellenose.
SO_3 0.12 FeS_2 0.73	Q 46.2 hy 1.8 or 27.2 pr 0.7 ab 9.4 an 4.4 C 8.3	Nagy-Mihaly, Hungary.	K. Muraközy.	K. Muraközy, F. K., XXII, p. 54, 1892.	Rhyolite.	
SO_3 0.22 FeS_2 1.55	Q 47.2 hy 1.6 or 25.6 pr 1.6 ab 10.0 an 3.1 C 7.9	Nagy-Mihaly, Hungary.	K. Muraközy.	K. Muraközy, F. K., XXII, p. 54, 1892.	Rhyolite.	
SO_3 0.07 FeS_2 0.15	Q 40.6 hy 2.9 or 30.6 ab 6.8 an 9.7 C 7.1	Nagy-Mihaly, Hungary.	K. Muraközy.	K. Muraközy, F. K., XXII, p. 54, 1892.	Rhyolite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. ALSBACHASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
6	74.81	13.87	1.68	n. d.	0.52	1.49	1.46	4.68	1.48							99.99	2.541
A3. III	1.244	.136	.011	(.022)	.013	.027	.023	.050									16°
7	74.58	13.31	1.31	n. d.	0.54	1.48	1.34	4.73	2.84							100.13	2.505
A3. III	1.243	.130	.008	(.016)	.014	.027	.021	.050									19°
8	73.03	13.51	3.12	n. d.	0.26	1.61	1.52	4.87	2.03							99.95	2.563
A4. IV	1.217	.132	.020	(.040)	.007	.029	.024	.051									18°
9	72.98	14.22	2.86	n. d.	0.33	1.35	1.88	5.61	0.89							100.12	
A4. IV	1.216	.139	.018	(.036)	.008	.024	.030	.060									

RANG 2. DOMALKALIC. ALSBACHASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	71.45	14.36	2.07	2.78	1.17	1.58	1.95	3.28	1.30							99.94	
A3. III	1.191	.142	.013	.039	.029	.029	.031	.035									
2	74.34	12.97	0.75	0.54	0.86	0.85	2.49	4.72	1.11	1.03	none	0.18	0.07	trace	0.07	100.06	
A1. I	1.239	.127	.005	.007	.022	.015	.040	.050				.002	—	—	—		
3	75.89	12.27	1.12	1.37	0.29	0.86	3.23	3.42	0.82			0.50	none	none		100.06	
A1. I	1.265	.120	.007	.019	.007	.015	.052	.036				.006	—	—			
4	75.34	12.51	0.42	1.55	0.32	1.07	3.31	4.17	0.86			none	none	0.07		100.04	
A1. I	1.256	.122	.003	.022	.008	.020	.053	.045				—	—	.001			
5	74.60	13.41	1.28	0.30	0.26	1.08	3.38	4.50	0.85	—		0.16	0.03	0.06	0.11	100.02	
A1. I	1.243	.131	.008	.004	.007	.020	.055	.048				.002	—	.001	.001		
6	70.29	11.83	1.30	2.08	1.24	2.30	2.68	3.05	1.35	0.10	3.25	0.29	0.07	0.12	0.07	100.02	
A1. I	1.172	.116	.008	.030	.031	.041	.042	.033				.004	—	.002			
7	74.65	14.11	1.08	0.29	0.20	0.80	2.81	4.59	1.40			0.21	trace	0.11	0.08	100.33	
A1. I	1.244	.138	.007	.004	.005	.014	.045	.049				.003	—	.002			
8	73.62	14.24	0.93	0.67	0.33	1.07	3.25	4.28	1.29			0.21	0.02	0.08	0.10	100.09	
A1. I	1.227	.140	.006	.009	.008	.020	.052	.046				.003	—	.001	.001		
9	73.81	13.93	0.93	0.46	0.72	0.88	2.80	4.81	0.74		trace	0.62	0.06	0.24	0.01	100.33	
A1. I	1.230	.136	.006	.006	.018	.016	.045	.051				.008	—	.003			
10	75.93	13.26	1.47	0.68	none	1.11	3.13	3.19	0.44		0.51	trace		trace		99.72	
A3. III	1.266	.130	.009	.010	—	.020	.050	.034				—		—			
11	72.11	13.71	0.29	0.90	0.44	1.44	3.22	3.33	4.19							99.63	2.346
A3. III	1.202	.134	.002	.012	.011	.026	.051	.035									
12	76.91	12.52	0.45	1.04	0.32	0.75	3.21	3.50	0.72							99.42	
A3. III	1.282	.123	.008	.014	.008	.013	.052	.037									

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 2. DOPOTASSIC. MIHALOSE—Continued.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 43.0 or 27.8 ab 12.1 an 7.5 C 3.7	hy 4.2	Briga, Piedmont.	L. Ricciardi.	L. Ricciardi, Att. Ac. Gioen., XVIII, p. 12, 1885.	Porphyry.	
	Q 44.0 or 27.8 ab 11.0 an 7.5 C 3.3	hy 3.5	Arolo, Lago Maggiore, Piedmont.	L. Ricciardi.	L. Ricciardi, Att. Ac. Gioen., XVIII, p. 9, 1885.	Porphyry.	
	Q 39.7 or 28.4 ab 12.6 an 8.1 C 2.9	hy 6.0	Ponte di Grata, n. Gozzano, Piedmont.	L. Ricciardi.	L. Ricciardi, Att. Ac. Gioen., XVIII, p. 14, 1885.	Porphyry.	
	Q 35.0 or 33.4 ab 15.7 an 6.7 C 2.6	hy 5.5	Ben Kassem, n. Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys., Genev., XXXIII, p. 26, 1900.	Liparite.	

SUBRANG 3. SODIPOTASSIC. TEHAMOSE.

Li_2O	trace	Q 40.9 or 19.5 ab 16.2 an 8.1 C 4.8	hy 6.3 mt 3.0	Sykesville, Maryland.	W. F. Hillebrand.	G. H. Williams, 15 A. R. U. S. G. S., p. 672, 1895.	Biotite-granite.	
ZrO_2 SO_3 Cl SrO Li_2O	0.05 0.03 none trace trace	Q 38.7 or 27.8 ab 21.0 an 4.2 C 2.2	hy 2.4 mt 1.2	Hyde Park Dike, Butte District, Montana.	H. N. Stokes.	W. H. Weed, B. U. S. G. S., 168, p. 119, 1900.	Rhyolite.	
SO_3 Li_2O	0.28 0.01	Q 41.6 or 20.0 ab 27.2 an 4.2 C 1.7	hy 1.6 mt 1.6 il 0.9	Mount Sheridan, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 426, 1899.	Rhyolite.	
SO_3 Li_2O	0.42 trace	Q 36.1 or 25.0 ab 27.8 an 5.6 C 0.4	hy 3.3 mt 0.7	Elephant's Back, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 426, 1899.	Rhyolite.	SO_3 for S.
SrO Li_2O	none trace	Q 34.7 or 26.7 ab 28.8 an 5.6 C 0.8	hy 0.7 mt 0.9 hm 0.6	Clipper Mine, Shasta County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 192, 1897.	Rhyolite.	Dried at 110°.
SrO Li_2O	trace? none	Q 36.1 or 18.3 ab 22.0 an 11.4	hy 4.4 mt 1.9 il 0.6	Near Buena Vista Peak, Amador County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 484, 1894.	Quartz-porphyry-schist.	Not fresh.
SrO Li_2O	trace none	Q 38.8 or 27.2 ab 23.6 an 3.9 C 3.1	hy 0.5 mt 0.9 il 0.5	Deer Creek Meadows, Tehama County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 192, 1897.	Rhyolite.	Dried at 110°.
SrO Li_2O	trace none	Q 35.5 or 25.6 ab 27.2 an 5.6 C 2.2	hy 0.3 mt 1.4 il 0.5	Slate Creek, Tehama County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 192, 1897.	Rhyolite.	Dried at 110°. Near toscanose.
ZrO_2 Cl FeS_2 CoO Cu Pb	trace 0.02 0.02 0.28 trace none	Q 36.2 or 28.4 ab 23.6 an 4.4 C 2.4	hy 1.8 hm 0.9 il 0.9	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. contr.	Granite.	
		Q 43.3 or 18.9 ab 26.2 an 5.6 C 2.7	mt 2.2	Tamaya, Chile.	C. Schwarz.	v. Groddeck, Z. D. G. G., XXXIX, p. 249, 1887.	Quartz-porphyry.	
		Q 36.8 or 19.5 ab 26.7 an 7.2 C 2.2	hy 2.4 mt 0.5	Faro del Caralete, Cabo de Gata, Spain.	A. Osann.	A. Osann, Z. D. G. G., XLIII, p. 693, 1891.	Liparite.	
		Q 42.2 or 20.6 ab 27.2 an 3.6 C 2.1	hy 2.2 mt 0.7	Grosssachsener Thal, Baden.	Dieckmann.	K. Futterer, Mt. Bad. G. L-A., II, p. 41, 1893.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. ALSBACHASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
13	72.37	15.18	1.75	0.71	1.54	2.01	2.12	3.54	1.11							100.33	
A3. III	1.206	.148	.011	.010	.039	.036	.034	.037									
14	72.15	13.56	1.29	1.48	1.52	2.25	2.74	3.55	1.11							99.65	
A3. III	1.203	.133	.008	.021	.038	.040	.044	.038									
15	76.12	12.18	1.21	0.72	1.12	1.54	2.55	3.21	1.51							100.16	
A3. III	1.269	.119	.007	.010	.028	.028	.041	.034									
16	75.21	12.15	1.74	0.38	0.89	1.23	2.88	4.25	0.92							99.65	
A3. III	1.254	.119	.011	.005	.022	.021	.047	.046									
17	74.41	13.65	0.65	0.95	0.87	1.16	2.56	3.98	1.50							99.73	
A3. III	1.240	.134	.004	.014	.022	.021	.041	.042									
18	72.04	15.98	1.08	1.70	1.08	2.11	2.22	3.45	0.66							100.32	
A3. III	1.201	.156	.007	.024	.027	.038	.035	.037									
19	74.80	12.60	1.53	0.83	0.17	0.79	2.54	4.83	1.08							99.17	
B3. IV	1.247	.123	.009	.011	.004	.014	.040	.051									
20	71.91	13.51	2.14	1.14	1.18	2.19	1.58	3.72	2.39					trace		99.76	2.618
A3. III	1.199	.132	.013	.015	.030	.039	.026	.039						—			18°
21	67.12	20.12	3.71	0.28	0.82	1.79	1.53	3.38	1.01		0.03					99.84	2.701
A3. III	1.119	.197	.023	.004	.021	.032	.024	.036									
22	68.8	14.9	0.9	4.3	1.1	1.9	2.7	2.8	2.0							99.4	
B3. IV	1.147	.146	.006	.060	.027	.034	.043	.030									
23	72.10	15.80	2.71	n. d.	1.27	1.99	3.10	3.12	0.50							100.59	
A4. IV	1.202	.155	.017	(.034)	.032	.036	.050	.033									
24	76.95	13.26	1.38	n. d.	0.48	1.22	2.18	4.17	0.35					trace		99.99	2.516
A3. III	1.283	.130	.009	(.018)	.012	.021	.035	.045						—			
25	77.94	11.78	1.21	n. d.	0.32	0.74	1.56	4.17	1.91							99.63	2.557
A3. III	1.299	.115	.007	(.014)	.008	.012	.026	.044									17°
26	73.64	15.07	n. d.	1.63	0.65	2.63	3.06	2.91	0.54				0.34	trace		100.57	
A3. III	1.226	.147	—	.022	.016	.047	.049	.031					.002	—			
27	70.57	16.13	3.52	n. d.	0.99	1.79	2.48	3.74	0.87							100.09	
A4. IV	1.176	.158	.022	(.044)	.025	.032	.040	.039									
28	73.87	15.00	1.30	n. d.	0.19	1.46	3.02	4.33	0.66							99.83	
A3. III	1.231	.147	.008	(.016)	.005	.027	.048	.046									
29	72.13	13.28	1.38	n. d.	0.40	1.05	3.60	3.58	4.75							100.17	
A3. III	1.202	.130	.009	(.018)	.010	.019	.058	.038									

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODIPOTASSIC. TEHAMOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 40.1 or 20.6 ab 17.8 an 10.0 C 4.2	hy 3.9 mt 2.5	Abruzzen, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 163, 1899.	Granitite.	
		Q 34.8 or 21.1 ab 23.1 an 11.1 C 1.1	hy 5.6 mt 1.9	Heidelberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 164, 1899.	Granitite.	
		Q 43.9 or 18.9 ab 21.5 an 7.8 C 1.6	hy 3.2 mt 1.6	Abruzzen, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 191, 1899.	Granite.	
		Q 37.9 or 25.6 ab 24.6 an 5.8 C 0.5	hy 2.2 mt 1.2 hm 1.0	Abruzzen, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 191, 1899.	Granite.	
		Q 40.1 or 23.4 ab 21.5 an 5.8 C 3.1	hy 3.3 mt 0.9	Hohesrad, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 190, 1899.	Granite (graphic).	
		Q 38.9 or 20.6 ab 18.3 an 10.6 C 4.7	hy 4.9 mt 1.6	Sauberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 167, 1899.	Granitite.	
		Q 40.0 or 28.4 ab 21.0 an 3.9 C 1.8	hy 0.7 mt 2.1	Käserngrat, Windgälle Mountains, Switzerland.	J. Mai.	C. Schmidt, N. J. B. B., IV, p. 432, 1886.	Porphyry.	
		Q 42.1 or 21.7 ab 13.6 an 10.8 C 2.9	hy 3.0 mt 3.3	Invorio Superiore, Lago d'Orta, Piedmont.	L. Ricciardi.	L. Ricciardi, Att. Ac. Gioen. Catan. XVIII (21), 1885.	Porphyry.	Near riesenose.
SO_3	0.05	Q 40.4 or 20.0 ab 12.6 an 8.9 C 10.7	hy 2.1 mt 0.9 hm 3.0	Staindrop Rig, Cheviot Hills, Scotland.	I. Macadam.	H. Kynaston, Tr. Edinb. G. Soc., VII, p. 394, 1899.	Granite.	Al_2O_3 high?
		Q 33.6 or 16.7 ab 22.5 an 9.5 C 4.0	hy 9.9 mt 1.4	Arenig, Wales.	J. H. Player.	J. J. H. Teall, Br. Petr., p. 339, 1888.	Ortho-felsite.	One decimal.
		Q 34.0 or 18.3 ab 26.2 an 10.0 C 3.7	hy 7.8	Quérigut, Pyrenees, France.	A. Pisani.	A. Lacroix, B. S. C. G. Fr., XI, No. 71, p. 31, 1900.	Granite.	
		Q 43.9 or 25.0 ab 18.3 an 5.8 C 3.0	hy 3.6	Bohnstädtberg, Hesse, Germany.	F. W. Schmidt.	C. Chelius, Erl. G. Kte. Hesse, I, Bl. Rossdorf, p. 54, 1886.	Granite.	Calc. to 100%?
		Q 50.0 or 24.5 ab 13.6 an 3.3 C 3.3	hy 2.6	Buccione, Lago d'Orta, Piedmont.	L. Ricciardi.	L. Ricciardi, Att. Ac. Gioen. Catan. XVIII (16), 1885.	"Porphyry."	
		Q 36.8 or 17.2 ab 25.7 an 13.1 C 2.0	hy 4.5	Monte della Fossa, Vulcano, Æolian. Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 104, 1892.	Rhyolite.	
		Q 34.3 or 21.7 ab 21.0 an 8.9 C 4.8	hy 8.3	W. of Karpi, Orivesi, Finland.	H. Berghell.	J. J. Sederholm, B. C. G. Finl., No. 6, p. 151, 1897.	Granite.	
		Q 35.5 or 25.6 ab 25.2 an 7.5 C 2.7	hy 2.7	Sidi Zerzor, n. Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem Soc. Phys., Genev., XXXIII, p. 15, 1900.	Liparite.	
		Q 33.6 or 21.1 ab 30.4 an 5.3 C 1.5	hy 3.4	Cape Marsa, n. Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Genev., XXXIII, p. 77, 1900.	Liparite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. ALSBACHASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	78.28	9.96	1.85	1.78	0.95	1.68	2.73	1.35	0.83	0.12		0.70	0.11	0.08	0.02	100.44	
A1. I	1.305	.098	.012	.025	.024	.030	.043	.015				.009	.001	.001			
2	76.20	14.41	n. d.	1.49	0.65	2.19	3.32	2.44								100.70	2.65
A3. III	1.270	.141	—	.021	.016	.039	.053	.025									
3	76.54	13.82	1.62	n. d.	0.01	0.85	4.32	2.31	0.20							99.67	
A3. III	1.276	.135	.010	(.020)	—	.015	.069	.024									
4	69.54	17.95	2.50	0.22	0.50	1.80	4.30	1.21	1.96			none	none	none		100.35	
A2. II	1.159	.176	.015	.003	.013	.032	.069	.013				—	—	—			
5	74.84	14.05	0.17	0.31	trace	1.57	3.66	3.14	2.33							100.07	2.38
A3. III	1.247	.138	.001	.004	—	.029	.059	.033									17°
6	79.49	11.60	0.32	0.49	0.09	1.64	4.04	1.52	0.68	——				none		99.88	
A3. III	1.325	.114	.002	.007	.002	.029	.065	.016						—			
7	68.15	15.00	1.18	0.60	0.87	1.91	3.13	0.96	8.70							100.50	2.497
A3. III	1.136	.147	.007	.008	.022	.034	.050	.010									
8	76.68	14.49	n. d.	1.09	0.84	1.53	3.92	1.20	0.36					trace		100.11	
A3. III	1.278	.142	—	.015	.021	.027	.063	.013						—			
9	75.88	14.75	trace	trace	0.16	2.08	3.78	2.60	0.20	——	none	0.50	trace	0.04		99.99	
A2. II	1.265	.145	—	—	.004	.038	.061	.027				.006	—	.001			
10	72.49	15.82	1.18	0.15	0.76	2.02	4.03	2.26	0.35	——	0.14	0.56	0.01	0.05		99.82	
A2. II	1.208	.155	.007	.002	.019	.036	.064	.024				.007	—	.001			
11	74.13	12.61	2.87	0.86	0.23	1.60	4.55	2.13	0.66					0.16		99.80	
A3. III	1.236	.123	.018	.012	.006	.029	.074	.022						.002			
12	72.63	13.49	2.17	1.04	0.89	1.65	3.86	2.62	0.31	0.23		0.07	0.26			99.26	
B2. III	1.211	.132	.014	.014	.022	.030	.062	.027				.001	.002				
13	77.35	13.16	0.73	0.78	0.99	1.09	2.67	2.35	1.40							100.52	
A3. III	1.289	.129	.004	.011	.025	.020	.043	.025									
14	74.65	12.64	2.26	0.85	1.01	2.12	3.41	2.37	1.14							100.45	
A3. III	1.244	.124	.014	.012	.025	.038	.055	.025									
15	72.89	15.83	1.89	0.10	1.31	2.04	2.81	2.29	1.21							100.37	
A3. III	1.215	.155	.012	.001	.033	.037	.045	.024									
16	76.41	13.08	1.99	n. d.	0.61	0.82	4.41	1.02	0.70			0.40				99.40	
B3. IV	1.274	.128	0.13	(.026)	.015	.014	.071	.011				.005					
17	73.08	13.50	2.60	0.13	0.15	1.07	3.95	3.19	1.33	——		0.62	trace	trace	0.06	99.80	2.514
A2. II	1.218	.132	.016	.002	.004	.020	.064	.034				.008	—	—	—		

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 4. DOSODIC. ALSBACHOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO trace Li_2O trace	Q 52.1 or 8.3 ab 22.5 an 8.3 C 1.0 hy 3.1 mt 2.8 il 1.2	Great Falls of the Potomac, Maryland.	W. F. Hillebrand.	G. H. Williams, 15 A. R. U. S. G. S. p. 670, 1895.	Granite-gneiss.	
	Q 41.2 or 13.9 ab 27.8 an 10.8 C 2.5 hy 4.4	Bad Vermilion Lake, Rainy River region, Ontario.	W. Lawson.	A. P. Coleman, J. G., IV. p. 909, 1896.	Granite.	
	Q 40.1 or 13.3 ab 36.2 an 4.2 C 2.8 hy 2.7	Granite Heights, Wausau, Wisconsin.	W W. Daniells.	E. R. Buckley, B. IV, G. Nh. S. Wisc, p. 136, 1898.	Granite.	
SO_3 0.37 Li_2O trace	Q 35.4 or 7.2 ab 36.2 an 8.9 C 6.2 hy 1.3 mt 0.7 hm 2.0	Mount Holmes, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 65, 1899.	Dacite-porphyry.	Al_2O_3 high?
	Q 38.0 or 18.3 ab 30.9 an 8.1 C 1.7 hy 0.4 mt 0.2	East Mountain, Elk Mountains, Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S., 148, p. 177, 1897.	Rhyolite.	
	Q 46.4 or 8.9 ab 34.1 an 8.1 C 0.4 hy 0.9 mt 0.5	Cinder Cone, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 79, p. 29, 1891.	Pumice. (Inclosure in basalt.)	Dried at 105°
	Q 41.2 or 5.6 ab 26.2 an 9.5 C 5.5 hy 2.2 mt 1.8	Oaxaca, Mexico.	A. Röhrig.	Felix and Lenk, Btr. G. Mex., II, p. 129, 1899.	Rhyolite.	Much H_2O.
	Q 43.9 or 7.2 ab 33.0 an 7.5 C 4.0 hy 4.1	Corinto, Nicaragua.	J. Petersen.	J. Petersen, N. J., 1898, II, p. 157.	Obsidian.	
S trace	Q 39.4 or 15.0 ab 32.0 an 10.6 C 1.9 hy 0.4	Average sample. Essequibo and Demerara rivers, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Essequibo, etc., rivers, p. 44, 1900.	Aplite.	Dried at 110°. Alkalies corr. Priv. contrib.
S none	Q 35.3 or 13.3 ab 33.5 an 10.0 C 3.1 hy 1.9 mt 0.5 il 1.1	Average sample. Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Essequibo, etc., rivers, p. 42, 1900.	Granitite.	Dried at 110°. Alkalies corr. Priv. contrib.
	Q 36.0 or 12.2 ab 38.8 an 7.5 hy 0.6 mt 2.8 hm 1.0	Melibocus, Odenwald, Hesse.	F. Kutscher.	C. Chelius, Notbl. Ver. Erdk. Darmst. (4), XIII, p. 8, 1892.	Alsbachite.	
SO_3 0.34	Q 35.7 or 15.0 ab 32.5 an 8.3 C 1.3 hy 2.2 mt 3.2	Hermesbuckel, n. Aschaffenburg, Hesse.	Not stated.	G. Klemm, Erl. G. Kte. Hessen, III, Bl. Schaafheim, p. 19, 1894.	Granite.	SO_3=S of FeS_2. Sum low.
	Q 48.5 or 13.9 ab 22.5 an 5.6 C 4.2 hy 3.4 mt 0.9	Schneegrube, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 189, 1899.	Granite (graphic).	
	Q 39.8 or 13.9 ab 28.8 an 10.6 C 0.6 hy 2.5 mt 3.1	Arnsdorf, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 176, 1899.	Granite.	
	Q 41.6 or 13.3 ab 23.6 an 10.3 C 5.0 hy 3.3 mt 0.2 hm 1.8	Schneekoppe, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 165, 1899.	Granitite.	
	Q 43.1 or 6.1 ab 37.2 an 3.9 C 3.3 hy 4.3 il 0.8	Mount Kastel, Crimea, Russia.	R. Prendel.	R. Prendel, Cf. N. J. 1887, II, p. 95.	Liparite.	
SO_3 0.12	Q 35.2 or 18.9 ab 33.5 an 5.6 C 1.4 hy 0.4 mt 0.5 hm 2.2	Waihi, Hauraki, Auckland Province, New Zealand.	P. Holland.	P. Holland, Q. J. G. S., LV, p. 467, 1899.	Rhyolite.	Dried at 100°.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. ALSBACHASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	74.79	12.59	1.19	n. d.	0.31	3.58	5.10	0.21	1.03	0.09	0.58	0.17	trace	trace	none	99.64	
A2. II	1.247	.123	.007	(.014)	.008	.064	.082	.002				.002	—	—	—		
2	72.77	3.00	1.28	12.65	0.67	2.47	4.95	0.34	1.16	0.07	0.47	0.22	0.04	0.08	trace	100.17	
A1. I	1.213	.127	.008	.037	.017	.045	.080	.003				.003	—	.001			
3	77.58	13.96	0.54	0.45	0.30	0.83	4.97	0.90	0.20	—	none	0.40	trace	none		100.13	
A2. II	1.293	.137	.003	.006	.008	.014	.080	.010				.005	—	—			
4	75.00	14.96	1.12	n. d.	1.41	0.83	4.83	0.70	1.62							100.47	2.55
A3. III	1.250	.147	.007	(.014)	.035	.014	.077	.008									

RANG 3. ALKALICALCIC. RIESENASE.

1	66.86	17.41	0.40	1.27	0.51	5.37	1.21	3.69	0.24		0.82	0.97	0.51	0.73		99.99	2.655
A2. II	1.114	.171	.003	.018	.013	.096	.019	.039				.012	.012	.010			
2	72.11	16.74	0.89	1.28	1.04	2.24	1.20	2.88	1.75							100.13	
A3. III	1.202	.164	.006	.018	.026	.040	.019	.030									
3	76.59	11.43	0.47	2.12	0.64	2.78	0.97	3.76	1.39							100.15	2.565
A3. III	1.278	.112	.003	.030	.016	.050	.016	.040									20°
4	72.10	13.98	2.08	2.38	1.02	2.41	1.07	3.29	1.65							99.98	2.551
A3. III	1.202	.137	.013	.033	.026	.043	.018	.035									18°
5	71.14	11.14	n. d.	2.73	1.62	3.17	1.40	4.13	1.77		trace	none	trace	trace		99.83	
A2. II	1.186	.110	—	.038	.041	.057	.022	.043				—	—	—			
6	70.20	15.48	0.86	1.07	0.93	2.36	1.24	4.38	1.80	—		trace	trace	trace		100.49	2.662
A2. II	1.170	.152	.005	.015	.023	.042	.020	.046				—	—	—			15°
7	76.33	12.84	2.22	n. d.	0.37	2.96	1.09	3.42	0.83							100.06	2.557
A4. IV	1.272	.126	.014	(.028)	.009	.052	.018	.036									17°
8	72.95	16.51	1.62	n. d.	0.43	3.27	1.04	3.12	0.98				0.23			100.15	2.623
A3. III	1.216	.162	.010	(.020)	.011	.059	.017	.033					.002				15°

RANG 3. ALKALICALCIC. RIESENASE.

1	70.74	14.68	0.69	0.58	0.28	4.12	2.29	2.59	2.09		2.14			0.06	0.03	100.29	2.680
A2. II	1.179	.144	.004	.008	.007	.073	.037	.027						.001			16°
2	65.67	13.48	1.51	n. d.	0.31	2.41	1.52	2.42	12.27				trace	trace	0.32	100.19	
A3. III	1.095	.132	.009	(.018)	.008	.043	.024	.025					—	—	0.02		
3	77.27	9.98	2.58	0.41	0.51	2.28	2.14	2.39	0.86		trace	trace	trace	0.99		99.41	2.667
A3. III	1.288	.098	.016	.005	.013	.941	.034	.024				—	—	.014			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 5. PERSODIC. YUKONOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO Li_2O	none none	Q 37.1 or 1.1 ab 43.0 an 10.8	di 5.5	Fort Hamlin, Yukon River, Alaska.	H. N. Stokes.	J. E. Spurr, B. U. S. G. S., 168, p. 229, 1900.	Tonalite-aplite.	
SrO Li_2O	trace trace	Q 34.9 or 1.7 ab 41.9 an 12.5	hy 5.1 mt 1.9 il 0.5	Greenville, Plumas County, California.	W. F. Hillebrand.	H. W. Turner, B. U. S. G. S., 148, p. 201, 1897.	Quartz-porphyry.	
		Q 42.8 or 5.6 ab 41.9 an 3.9 C 3.4	hy 0.6 mt 0.7 il 0.8	Towakaima Falls, Barama River, British Guiana.	Assistant of J. B. Harrison.	Rep. G. N. W. Distr., II, 1898, p. 10.	Aplite.	Dried at 110°. Alkalies?
		Q 39.8 or 4.4 ab 40.3 an 3.9 C 4.9	hy 5.3	Mount Kastel, Crimea, Russia.	R. Prendel.	R. Prendel, N. J., 1887, II. Cf. p. 96.	Liparite.	Near westphalose.

SUBRANG 2. DOPOTASSIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3	trace	Q 35.0 or 21.7 ab 10.0 an 23.1 C 3.1	hy 1.7 mt 0.7 il 1.8 ap 1.3	Nieder Modau, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. K. Hesse, I, Bl. Rossdorf, p. 44, 1886.	Granite-porphyry.	
		Q 47.4 or 16.7 ab 10.0 an 11.1 C 7.7	hy 4.2 mt 1.4	Bärndorfer Berg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 222, 1899.	Schliere in granite.	
		Q 47.9 or 22.2 ab 8.4 an 13.9 C 0.6	hy 5.0 mt 0.7	Between Bolzano and Ameno, Lago d'Orta, Piedmont.	L. Ricciardi.	L. Ricciardi, Atti. Ac. Gioen. Catan., XVIII, (18), 1885.	Porphyry.	
		Q 45.1 or 19.5 ab 9.4 an 12.0 C 4.2	hy 5.3 mt 3.0	Arona, Lago Maggiore, Piedmont.	L. Ricciardi.	L. Ricciardi, Atti. Ac. Gioen. Catan., XVIII, (8), 1885.	Porphyry.	
X SO_3 Cl Li_2O	1.05 1.78 trace trace	Q 36.9 or 23.9 ab 11.5 an 12.5	di 2.9 hy 7.7	Sassoforte, Roccastrada, Tuscany.	R. V. Matteucci.	R. V. Matteucci, B. C. G. It., XXI, p. 285, 1890.	Trachyte.	X includes SiO_2 and Pt. SO_3 for S?
S ZnO	0.03 2.14	Q 39.4 or 25.6 ab 10.5 an 11.7 C 4.5	hy 3.6 mt 1.2	Serpieri Mine, Laurium, Greece.	R. Lepsius.	R. Lepsius, G. von Attika, Berlin, 1893, p. 93.	Granite.	ZnO as silicate?
		Q 48.4 or 20.0 ab 9.4 an 14.5 C 2.0	hy 4.6	Between Bolzano and Ameno, Lago d'Orta, Piedmont.	L. Ricciardi.	L. Ricciardi, Atti. Ac. Gioen. Catan., XVIII, (17), 1885.	Porphyry.	Cf. No. 3 above.
		Q 46.0 or 18.3 ab 8.9 an 16.4 C 5.4	hy 3.7	Mte. Deruta, Umbria.	L. Ricciardi.	A. Verri, B. S. G. It., V, p. 54, 1886.	Granite.	

SUBRANG 3. SODIPOTASSIC. RIESENOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl SrO	trace trace	Q 38.5 or 15.0 ab 19.4 an 20.3 C 0.7	hy 1.0 mt 0.9	Leadville, Colorado.	W. F. Hillebrand.	W. Cross, M. U. S. G. S., XII, p. 332, 1886.		
SO_3	0.28	Q 41.3 or 13.9 ab 12.6 an 12.0 C 4.1	hy 3.2	Silver Cliff, Custer County, Colorado.	L. G. Eakins.	Cross and Eakins, A. J. S., XLIV, p. 101, 1892.	Pitchstone.	Much H_2O.
		Q 50.6 or 13.9 ab 17.8 an 10.8 C 0.3	hy 1.3 mt 1.2 hm 1.7	Wengenwiese, Heuweg, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kte. Hesse, I, Bl. Rossdorf, p. 35, 1886.	Granite.	MnO high.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. RIESENASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
	76.82	143.68	1.75	0.32	0.51	2.83	1.55	2.10	0.74							100.30	
A3. III	1.280	.134	.011	.004	.013	.050	.025	.022									
5	75.27	13.98	1.90	1.00	1.44	2.16	1.54	2.01	0.91							100.21	
A3. III	1.255	.137	.012	.014	.036	.039	.025	.021									
6	75.21	14.18	0.75	1.05	0.44	2.40	1.74	3.12	1.01							99.90	
A3. III	1.254	.139	.005	.015	.011	.043	.028	.033									
7	72.92	17.77	0.20	1.09	0.79	2.17	1.24	2.65	1.35							100.18	
A3. III	1.215	.174	.001	.015	.020	.039	.020	.028									
8	72.71	14.59	1.78	0.92	2.17	2.57	1.65	1.99	1.67							100.05	
A3. III	1.212	.143	.011	.012	.054	.047	.027	.021									
9	69.04	16.91	2.22	1.36	1.86	3.16	1.76	2.44	1.01							99.76	
A3. III	1.151	.166	.014	.019	.047	.056	.028	.025									
10	69.40	15.79	2.15	n. d.	2.36	4.68	1.34	2.76	1.44							99.92	
A4. IV	1.157	.155	.014	(.028)	.059	.084	.021	.030									
11	73.00	14.45	n. d.	3.12	0.82	3.30	1.70	3.18	0.70	——	trace	trace	trace	trace		100.27	2.76
A3. III	1.217	.142	——	.043	.021	.059	.027	.034				——	——	——			
12	69.36	16.93	1.27	1.25	0.92	3.66	2.16	3.20	1.10			none	trace			99.85	2.680
A3. III	1.156	.166	.008	.017	.023	.065	.035	.034				——	——				15°

RANG 3. ALKALICALCIC. RIESENASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	73.69	12.89	1.02	2.59	0.50	3.74	2.81	1.48	1.06			trace	trace	trace		99.78	
A3. III	1.228	.126	.006	.036	.013	.067	.045	.016				——	——	——			
2	73.65	11.19	1.31	3.25	0.51	2.78	3.74	1.86	0.44							99.23	
B3. IV	1.228	.110	.008	.045	.013	.050	.060	.020									
3	71.50	17.44	0.45	1.98	1.03	3.00	2.45	1.53	0.68	——	0.42	0.10	trace	none		100.56	
A2. II	1.192	.171	.003	.028	.026	.053	.040	.016				.001	——	——			
4	72.81	15.22	1.88	1.40	1.10	2.77	2.10	1.54	1.66							100.48	
A3. III	1.214	.149	.012	.019	.027	.050	.034	.016									
5	76.13	12.44	0.74	n. d.	0.83	3.25	3.34	1.50	1.52							99.75	
A3. III	1.269	.122	.005	(.010)	.021	.058	.054	.016									
6	69.10	16.32	3.70	1.37	1.12	5.10	2.91	1.06	n. d.							100.68	2.456
A3. III	1.152	.160	.023	.019	.028	.091	.047	.012									

ORDER 3. QUARFELIC. COLUMBARE—Continued

SUBRANG 3. SODIPOTASSIC. RIESENOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 53.1 or 12.2 ab 13.1 an 13.9 C 3.8	hy 1.3 mt 0.9 hm 1.1	Schlüsselberg, n. Schmiedeberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 180, 1899.	Granite.	
		Q 51.8 or 11.7 ab 13.1 an 10.8 C 5.2	hy 3.9 mt 2.8	Grünbusch, n. Hirschberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 194, 1899.	Granite.	
		Q 46.9 or 18.3 ab 14.7 an 12.0 C 3.6	hy 2.4 mt 1.2	Bolzenschloss Berg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 186, 1899.	Aplite.	
		Q 48.9 or 15.6 ab 10.5 an 10.8 C 8.9	hy 3.8 mt 0.2	Above Buche, Schmiedeberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 168, 1899.	Granitite.	
		Q 46.6 or 11.7 ab 14.1 an 13.1 C 4.9	hy 5.4 mt 2.7	Grünbusch, n. Hirschberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 169, 1899.	Granitite.	
		Q 40.1 or 13.9 ab 14.7 an 15.6 C 5.8	hy 5.7 mt 3.2	Grünbusch, n. Hirschberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 210, 1899.	Granodiorite.	
		Q 35.8 or 16.7 ab 11.0 an 23.4 C 2.1	hy 9.6	Radworza, Bachergebirge, Styria.	A. Pontoni.	A. Pontoni, T. M. P. M., XIV, p. 370, 1895.	Granite-porphyry.	
B_2O_3 SO_3 Cl Li_2O	trace trace trace trace	Q 40.1 or 18.9 ab 14.1 an 16.4 C 2.2	hy 7.7	Torniella, Roccastrada, Grosseto, Italy.	R. V. Matteucci.	R. V. Matteucci, B. S. G. It., X, p. 677, 1891.	Nevadite.	
		Q 34.8 or 18.9 ab 18.3 an 18.1 C 3,3	hy 3.5 mt 1.9	Plaka, Laurion, Greece.	R. Lepsius.	R. Lepsius, G. v. Attika, Berlin, 1893, p. 89.	Granite.	

SUBRANG 4. DOSODIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO Li_2O	trace trace	Q 41.2 or 8.9 ab 23.6 an 18.1	di 0.4 hy 5.0 mt 1.4	Port Deposit, Baltimore, Maryland.	W. Bromwell.	G. P. Grimsley, J. Cinn. Soc. Nh., XVII, 1894.	Granite.	Cf. W. C. Day, 18 A. R. U. S. G.S., V, p. 963, 1897.
		Q 37.1 or 11.1 ab 31.4 an 8.3	di 4.8 hy 3.7 mt 1.9	Berlin, Wisconsin.	S. Weidman.	S. Weidman, B. III, Wisc. G. Nh. S., p. 2, 1898.	Rhyolite-gneiss.	Sum low.
S	trace	Q 41.9 or 8.9 ab 21.0 an 14.7 C 6.3	hy 6.0 mt 0.7	Potaro, etc., rivers (average sample), British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, Rep. G. Essequibo, etc., rivers, p. 52, 1900.	Quartz-porphyrite.	Dried at 110°. Alkalies corr. Priv. contr., J. B. H.
		Q 46.8 or 8.9 ab 17.8 an 13.9 C 5.0	hy 3.6 mt 2.8	Koppenkegel. Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 152, 1899.	Granitite.	
		Q 43.2 or 8.9 ab 28.3 an 13.9	di 1.8 hy 1.3 mt 0.7	Bolzenschloss, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 184, 1899.	Aplite.	
		Q 35.3 or 6.7 ab 24.6 an 25.3 C 1.0	hy 2.8 mt 4.4 hm 0.6	Izu-san, Japan.	B. Koto.	B. Koto, Q. J. G. S., XL, p. 445, 1884	Andesite.	

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. RIESENASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	72.24	13.84	1.45	1.86	1.10	3.40	4.43	0.39	0.69	0.17		0.41	0.10	0.12	0.08	100.28	
A1. I	1.204	.136	.009	.026	.028	.060	.071	.004				.005	.001	.002			
2	72.54	16.19	1.16	1.17	0.65	3.25	4.47	0.23	0.05	——	none	0.20	0.12	trace		100.03	
A2. II	1.209	.159	.007	.017	.016	.058	.072	.002				.002	.001	——			
3	66.99	17.56	1.41	3.39	0.93	4.25	3.35	0.34	1.53				trace	trace		99.75	
A3. III	1.117	.172	.009	.048	.023	.076	.054	.003					——	——			

RANG 4. DOCALCIC.

1	77.61	13.34	2.07	n. d.	0.52	3.67	0.61	2.04	0.55							100.41	2.556
A4. IV	1.294	.132	.013	(.026)	.013	.066	.009	.021									17°

RANG 4. DOCALCIC.

1	68.87	16.42	1.91	2.06	2.54	4.64	1.25	1.10	1.12							99.91	
A3. III	1.148	.161	.012	.029	.064	.083	.020	.012									

CLASS I. PERSALANE.

RANG 1. PERALKALIC. LIPARASE.

1	70.65	16.16	1.53	0.52	trace	0.55	0.54	8.66	1.22					trace		99.83	2.62
A3. III	1.178	.159	.009	.007	——	.010	.009	.092						——			
2	68.13	15.75	1.60	0.74	0.45	0.27	0.61	10.54	1.90			0.31	trace			100.37	2.573
A2. II	1.136	.154	.010	.010	.011	.005	.010	.112				.004	——				
3	69.06	14.41	1.89	0.54	0.39	trace	0.24	12.33	0.96		0.09	0.24	0.08			100.51	2.553
A2. II	1.151	.141	.012	.007	.010		.004	.131				.003	.001				

RANG 1. PERALKALIC. LIPARASE.

1	75.20	12.98	0.37	0.27	0.12	0.29	2.02	8.38	0.58				trace	0.03		100.22	
A3. III	1.253	.127	.003	.004	.003	.005	.032	.089					——	——			
2	73.90	13.65	0.28	0.42	0.14	0.23	2.53	7.99	0.33	0.16		0.07	0.05	trace	trace	99.75	
A1. I	1.232	.134	.002	.006	.004	.004	.040	.085				.001	——	——	——		
3	71.12	13.35	1.37	1.28	0.47	0.32	2.02	9.82	1.13							100.88	
A3. III	1.185	.131	.009	.018	.012	.005	.032	.104									
4	75.44	12.33	0.49	1.00	0.52	trace	2.38	7.13	1.26			0.07		0.11		101.73	
C2. IV	1.257	.121	.003	.014	.013	——	.039	.075				.001		.002			
5	75.47	11.21	0.44	n. d.	0.30	0.80	2.98	7.98	0.85			none		0.11		100.14	
A3. III	1.258	.110	.003	(.006)	.008	.014	.048	.085				——		.002			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 5. PERSODIC. VULCANOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO	trace	Q 35.6 or 2.2 ab 37.2 an 16.7	hy 4.6 mt 2.1 il 0.8	Near Milton, Calaveras County, California.	Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 484, 1894.	Quartz-porphyrite.	
		Q 37.4 or 1.1 ab 37.7 an 16.1 C 2.8	hy 2.9 mt 1.6	Towakaima Falls, Barama River, British Guiana.	Assistant of J.B.Harrison.	J. B. Harrison, Rep. G. N.W. Distr., II, p. 10, 1898.	Granite-gneiss.	Dried at 110°. Alkalies?
		Q 33.7 or 1.7 ab 28.3 an 21.1 C 4.0	hy 7.4 mt 2.1	Projectile of 1888, Vulcano, Æolian Islands.	L. Kahlenberg.	W. H. Hobbs, B. G. S. A., V, p. 601, 1894. Z. D. G. G., XLV, p. 591, 1893.	Vulcanite.	

SUBRANG 1. PREPOTASSIC.

		Q 56.6 or 11.7 ab 4.7 an 18.3 C 3.7	hy 4.6	Buccione, Lago d'Orta, Piedmont.	L. Ricciardi.	L. Ricciardi, Att. Ac. Gioen. Catan., XVIII, p. 17, 1885.	Porphyry.	

SUBRANG 2. SODIPOTASSIC.

		Q 42.5 or 6.7 ab 10.5 an 23.1 C 4.7	hy 8.6 mt 2.8	Vorderberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 214, 1899.	Schliere in granite.	

ORDER 4. QUARDOFELIC. BRITANNARE.

SUBRANG 1. PERPOTASSIC. LEBACHOSE.

		Q 33.1 or 51.2 ab 4.7 an 2.8 C 5.0	mt 2.1	Chywoon Morvah, Cornwall.	J. A. Phillips.	J. J. H. Teall, Br. Petr., p. 314, 1898.	Granite.	
SO_3	0.07	Q 23.0 or 62.3 ab 5.2 an 1.4 C 2.8	hy 1.1 mt 1.4 il 0.6 hm 0.6	Himmelberg, Bl. Lebach, Prussia.	K. Boettcher.	Weiss and Grebe, Erl. G. Kte. Preuss, Bl. Lebach, p. 30, 1889.	Quartz-porphyry.	SO_3 for S.
SO_3	0.28	Q 19.9 or 72.8 ab 2.1 C 0.6	hy 1.0 mt 1.6 hm 0.8	Mutterbach, Masserthal, Thüringerwald.	Hampe.	H. Loretz, Jb. Pr. G. L.-A. (1888), p. 295, 1889.	Quartz-orthoclasite.	SO_3 for S.

SUBRANG 2. DOPOTASSIC. OMEOSE.

		Q 30.2 or 49.5 ab 16.8 an 1.4	hy 0.4 mt 0.7	Round Mountain, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, Pr. Col. Sc. Soc., II, p. 33, 1887.	Rhyolite.	Also in 17 A. R. U. S. G. S., II, p. 324, 1896.
F SrO Li_2O	none none trace	Q 28.0 or 47.3 ab 21.0 an 1.1 C 0.5	hy 0.8 mt 0.5	Currant Creek Canyon, Pike's Peak, Colorado.	W. F. Hillebrand.	E. B. Mathews, B. U. S. G. S., 148, p. 160, 1897.	Granite.	
		Q 20.9 or 57.8 ab 14.1	ac 2.3 di 1.2 hy 2.5 mt 0.9	Torre de la Testa, Cabo de Gata, Spain.	A. Osann.	A. Osann, Z. D. G. G XLIII, p. 695, 1891.	Liparite.	
ZrO_2 FeS_2	0.34 0.66	Q 32.9 or 41.7 ab 20.4 C 0.7	hy 2.7 mt 0.7	N. of Drammen, Norway.	P. Jannasch.	W. C. Brögger, Z. K., XVI, p. 77, 1890.	Quartz-porphyry.	Sum high.
		Q 32.8 or 47.3 ab 13.1	ns 2.9 di 3.3	Kolsjön, Smaland, Sweden.	H. Santesson.	O. Nordenskjöld, B. G. Inst. Un. Upsala, I, p. 216, 1894.	Rhyolite (Hälleflinta).	Alkalies high?

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
6	71.62	12.83	0.13	.010	n. d.	1.48	3.81	9.69	0.02							99.68	
A3. III	1.194	.126	.001	.001	—	.027	.060	.103									
7	74.66	11.49	2.02	n. d.	0.10	0.44	1.69	8.68	0.74				0.07	0.08		99.97	2.598
A3. III	1.244	.113	.013	(.014)	.003	.008	.027	.021					.001	.001			20.5°
8	63.25	16.53	3.10	0.26	0.53	0.26	1.19	11.00	2.71		none	0.52	0.27			99.74	2.559
A2. II	1.054	.162	.020	.004	.013	.004	.018	.117				.007	.002				
9	70.91	15.32	trace	none	0.07	0.58	2.31	10.07	0.51	—						99.77	2.564
A3. III	1.182	.150	—	—	.002	.010	.037	.107									
10	68.87	16.62	0.43	2.72	1.60	0.71	1.80.	6.48	0.74	—			0.05			100.02	2.762
A3. III	1.148	.163	.003	.038	.040	.012	.029	.069					—				

RANG 1. PERALKALIC. LIPARASE.

1	75.98	12.34	0.85	0.93	0.15	0.13	4.02	4.44	0.64	0.24	none	0.17	0.03	trace	0.07	100.02	
A1. I	1.266	.121	.005	.012	.004	.002	.064	.047				.002	—	—	—		
2	72.77	12.15	0.44	3.06	0.22	0.07	3.38	4.67	0.55	0.17	2.06	0.20	trace	0.16	0.03	100.09	
A1. I	1.213	.119	.003	.043	.006	.001	.055	.050				.003	—	.002	—		
3	73.69	12.46	1.21	1.75	0.17	0.36	4.47	4.92	0.24	0.14	trace	0.28	0.04	0.15	none	100.09	
A1. I	1.228	.122	.007	.024	.004	.007	.072	.052			—	.004	—	.002	—		
4	73.03	13.43	0.40	1.49	0.14	0.79	4.91	4.54	0.35	0.18	trace	0.30	0.06	0.15	trace	100.03	
A1. I	1.217	.132	.003	.020	.004	.014	.079	.048				.004	—	.002	—		
5	71.90	14.12	1.20	0.86	0.33	1.13	4.52	4.81	0.42	0.18	0.21	0.35	0.11	0.05	0.04	100.35	
A1. I	1.198	.138	.008	.012	.008	.020	.072	.051				.004	.001	.001	—		
6	77.61	11.94	0.55	0.87	trace	0.31	3.80	4.98	0.23	trace		0.25		trace		100.54	2.618
A2. II	1.294	.117	.004	.012	—	.006	.061	0.53				.003		—			18°
7	76.49	11.89	1.16	1.56	trace	0.14	4.03	5.00	0.38	0.12		trace		trace		100.77	2.650
A3. III	1.275	.117	.007	.022	—	.002	.064	.053				—		—			13°
8	67.35	15.05	1.23	4.76	0.03	0.55	4.42	6.08	0.17	0.16		0.60		0.05		100.45	2.69
A2. II	1.123	.148	.008	.066	.001	.010	.071	.065				008		.001			17°
9	77.49	11.89	0.34	1.12	0.09	0.45	4.58	4.26	0.16	—				trace		100.63	
A3. III	1.292	.116	.002	.015	.002	.008	.074	.045						—			
10	76.44	12.95	0.19	0.89	trace	0.15	4.76	4.95	0.09	—		0.37		trace		100.79	
B2. III	1.274	.127	.001	.012	—	.003	.077	.058				.005		—			
11	73.93	12.29	2.91	1.55	0.04	0.31	4.66	4.63	0.41	—		0.18		trace	none	100.91	2.642
B2. III	1.232	.120	.018	.022	.001	.006	.075	.049				.002		—			22°
12	71.40	14.76	1.68	0.72	0.55	0.10	4.79	5.16	1.46	—				trace		100.62	
A3. III	1.190	.145	.011	.010	.014	.002	.077	.055						—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 2. DOPOTASSIC. OMEOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 22.2 or 57.3 ab 12.1	ns 4.5 ac 0.5 di 0.3 wo 3.0	Söderö, Wänö, Finland.	H. Berghell.	H. Berghell, Finl. G. Und., Bl. 23, p. 18, 1892.	Microcline-granite.	Alkalies high?
		Q 31.0 or 51.2 ab 11.0	ac 2.7 di 1.9 hy 1.2	Gross-Umstadt, Hesse.	Not stated.	C. Vogel, Abh. G. L.-A. Darms., II, p. 49, 1891.	Quartz-porphyry.	
SO$_3$	0.12	Q 13.4 or 65.1 ab 9.4 an 1.1 C 2.3	hy 1.3 il 0.6 hm 3.1	Heckmannsloch, Blatt Wahlen, Prussia.	Gremse.	H. Grebe, Erl. G. Kte. Preuss. Bl. Wahlen, p. 29, 1889.	Quartz-porphyry.	Fe$_2$O$_3$ and K$_2$O high?
		Q 18.0 or 59.5 ab 19.4 an 1.7	di 0.7	Wilson's Creek, Omeo, Victoria.	A. W. Howitt.	A. W. Howitt, T.R.Soc.Vict., XXIV, p. 120, 1888.	Graphic granite.	Dried at 100°.
		Q 27.7 or 38.4 ab 15.2 an 3.2 C 5.4	hy 8.6 mt 0.7	Wilson's Creek, Omeo, Victoria.	A. W. Howitt.	A. W. Howitt, T.R.Soc.Vict., XXIV, p. 122, 1888.	Granite.	Dried at 100°.

SUBRANG 3. SODIPOTASSIC. LIPAROSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO$_2$ S NiO SrO Li$_2$O	0.03 none none none trace	Q 35.1 or 26.1 ab 33.5 an 0.6 C 0.8	hy 1.4 mt 1.2	Haystack Mountain, Aroostook County, Maine.	W. F. Hillebrand.	H. E. Gregory, B. U. S. G. S., 165, p. 155, 1900.	Rhyolite.	
ZrO$_2$ FeS$_2$ Cr$_2$O$_3$ SrO Li$_2$O	0.04 0.12 none none trace	Q 32.1 or 27.8 ab 28.8 an 0.8 C 1.3	hy 5.9 mt 0.7	Quoggy Joe Mountain, Aroostook County, Maine.	W. F. Hillebrand.	H. E. Gregory, B. U. S. G. S., 165, p. 166, 1900.	Bostonite.	
ZrO$_2$ Cl F FeS$_2$	0.14 0.02 0.05 none	Q 26.8 or 28.9 ab 37.7	ac 0.9 di 1.6 hy 2.2 mt 1.2 il 0.6	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 69, 1897.	Granite-porphyry.	
ZrO$_2$ Cl F FeS$_2$	0.06 0.03 0.08 0.09	Q 24.9 or 26.7 ab 41.4 an 1.4	di 2.2 hy 1.6 mt 0.7	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 68, 1897.	Syenite-porphyry.	
ZrO$_2$ Cl F FeS$_2$ NiO	0.04 0.02 0.06 trace none	Q 24.5 or 28.4 ab 37.7 an 4.2	di 1.1 hy 0.3 mt 1.9 il 0.6	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 68, 1897.	Granitite.	
		Q 35.4 or 29.5 ab 32.0 an 0.8	di 0.8 hy 0.2 mt 0.9 il 0.5	Rockport, Cape Ann, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VI, p. 793, 1898.	Hornblende-granite.	
		Q 33.4 or 29.5 ab 33.5	di 0.4 hy 1.8 mt 1.6	Magnolia, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 113, 1899.	Paisanite.	
		Q 14.2 or 36.1 ab 37.2 an 2.8	hy 6.6 mt 1.9 il 1.2	Pigeon Hill Quarry, Rockport, Cape Ann, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VI, p. 795, 1898.	Quartz-syenite.	Inclosure in granite, No. 6, above.
		Q 33.4 or 25.0 ab 37.7	ac 0.9 di 2.0 hy 1.2	Bass Rocks, Cape Ann, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 107, 1899.	Aplite.	Dried at 110°. Border of dike.
		Q 28.6 or 29.5 ab 39.8	ac 0.5 di 0.8 hy 0.5 il 0.8	Bass Rocks, Cape Ann, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 107, 1899.	Aplite.	Dried at 110°. Center of dike.
		Q 28.9 or 27.2 ab 37.2	ac 1.8 di 1.5 hy 0.4 mt 3.2	Hardwicke Quarry, Quincy, Massachusetts.	H. S. Washington.	H. S. Washington, A. J. S., VI, p. 181, 1898.	Granite.	Dried at 110°. Sum high.
		Q 22.8 or 30.6 ab 40.3 an 0.6 C 1.1	hy 1.4 mt 2.4	Marblehead Neck, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 293, 1899.	Keratophyre (bostonite).	Dried at 110°

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
13	70.23	15.00	1.99	n. d.	0.38	0.33	4.98	4.99	1.28	0.91		0.03	0.06	0.24		100.42	
A3. III	1.171	.147	.012	(.024)	.010	.006	.080	.053				—	—	.003			
14	72.06	14.83	1.28	0.64	0.13	1.20	4.31	5.64	0.65					trace		100.86	2.640
A3. III	1.201	.145	.008	.009	.004	.021	.069	.060						—			
15	68.96	15.25	3.28	none	0.20	0.76	5.45	5.01	0.91					0.23		100.05	
A3. III	1.149	.150	.021	—	.005	.014	.088	.054						.003			
16	74.87	14.27	trace	0.51	0.16	0.48	3.06	5.36	0.66	0.26		0.05	0.21	trace		99.89	
A2. II	1.248	.140	—	.007	.004	.009	.049	.058				.001	.002	—			
17	72.17	14.44	1.02	0.99	0.70	0.69	3.65	4.84	n. d.	n. d.		0.27				98.77	
A2. II	1.203	.142	.006	.014	.018	.012	.059	.051				.003					
18	73.70	12.87	3.76	0.31	0.11	0.14	3.63	4.56	0.57	—			trace	0.07		99.84	
A3. III	1.228	.126	.024	.004	.003	.002	.058	.049					—	.001			
19	72.42	13.04	0.68	2.49	0.58	0.66	3.44	4.97	1.21	—		0.40	0.20	0.09	0.15	100.37	2.620
A1. I	1.207	.128	.004	.035	.015	.011	.055	.054				.005	.001	.001			
20	68.36	13.76	2.65	2.75	0.68	0.70	3.56	4.48	0.98	—		1.57	0.33	trace		100.48	
A1. I	1.139	.135	.017	.039	.017	.012	.057	.048				.020	.002	—			
21	72.35	13.78	1.87	0.36	0.42	0.87	4.44	4.49	0.54	0.22		0.44	0.13	0.06		99.87	
A2. II	1.206	.135	.012	.005	.011	.016	.071	.048				.006	.001	.001			
22	71.88	12.88	3.05	1.05	0.33	1.13	4.21	4.46	0.26	0.17		0.22	0.15	trace		99.81	
A2. II	1.198	.126	.019	.015	.008	.020	.068	.048				.003	.001	—			
23	71.33	12.55	3.75	0.85	0.58	0.94	4.52	4.20	0.30	0.12		0.55	0.16	0.04		100.04	
A2. II	1.189	.123	.024	.012	.015	.017	.072	.045				.007	.001	—			
24	68.71	13.45	5.31	0.75	0.19	0.96	4.63	5.51	0.36	0.13		0.21	0.04	0.14	none	100.44	
A1. I	1.145	.132	.033	.010	.005	.017	.075	.059				.003	—	.002			
25	73.35	14.38	1.96	0.34	0.09	0.26	4.33	5.66	n. d.	n. d.						100.37	
A3. III	1.223	.141	.012	.005	.002	.005	.070	.060									
26	68.34	15.32	1.90	0.84	0.54	0.92	5.45	5.62	0.30	0.15		0.21	0.13	0.07	0.08	99.95	
A1. I	1.139	.149	.012	.012	.014	.016	.089	.060				.003	.001	.001			
27	68.65	18.31	0.56	0.08	0.12	1.00	4.86	4.74	0.83	0.27		0.20	trace	trace	0.13	99.88	
A1. I	1.144	.180	.003	.001	.003	.018	.078	.050				.003	—	—	.001		
28	74.90	13.64	0.66	0.50	trace	0.61	4.22	4.64	0.33			0.15		trace		99.65	2.61
A2. II	1.248	.134	.004	.007	—	.011	.068	.049				.002		—			
29	74.82	13.80	0.37	0.30	0.10	0.17	4.33	4.81	0.83			0.25		trace		99.78	2.59
A2. II	1.244	.135	.002	.004	.003	.003	.070	.051				.003		—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 19.6 or 29.5 ab 41.9 an 1.7 C 0.8	hy 4.1	Marblehead Neck, Essex County, Massachusetts.	T. M. Chatard.	J. H. Sears, B. M. C. Z., XVI, p. 170, 1890.	Keratophyre (bostonite).	
S	0.12	Q 23.1 or 33.3 ab 36.2 an 4.4	di 1.1 mt 1.9	Brooklyn Quarry, Stony Creek, Connecticut.	H. T. Vulté.	J. F. Kemp, B. G. S. A., X, p. 375, 1899.	Granite.	
		Q 16.2 or 30.0 ab 46.1 an 2.2	di 1.3 hm 3.3	Beekmantown, Clinton County, New York.	E. W. Morley.	H. P. Cushing, B. G. S. A., IX, p. 248, 1898.	Syenite-porphyry.	
Li_2O	trace	Q 34.6 or 32.2 ab 25.7 an 2.5 C 2.4	hy 1.4	Brookville, Montgomery County, Maryland.	W. F. Hillebrand.	G. H. Williams, 15 A. R. U. S. G. S., p. 672, 1895.	Granite.	
		Q 29.6 or 28.4 ab 30.9 an 3.3 C 2.0	hy 2.9 mt 1.4	Felch Mountain, Michigan.	H. N. Stokes.	H. L. Smith, M. U. S. G. S., XXXVI, p. 389, 1899.	Granite.	H_2O not determined.
		Q 34.7 or 27.2 ab 30.4 an 0.6 C 1.7	hy 0.3 mt 0.9 hm 3.2	Little Brick Island, Pigeon Point, Minnesota.	L. G. Eakins.	W. S. Bayley, B. U. S. G. S., 109, p. 58, 1893.	Quartz-keratophyre.	Dried at 105°.
Cl Li_2O	trace trace	Q 29.4 or 30.0 ab 28.8 an 3.2 C 0.8	hy 5.0 mt 0.9 il 0.8	Pigeon Point, Minnesota.	W. F. Hillebrand.	W. S. Bayley, A. J. S., XXXVII, p. 59, 1889.	Soda-granite.	Dried at 105°. Seven specimens.
SO_3 Li_2O	0.66 none	Q 28.0 or 26.7 ab 29.9 an 3.3 C 1.8	hy 1.9 mt 3.9 il 3.1	Pigeon Point, Minnesota.	J. E. Whitfield.	W. S. Bayley, B. U. S. G. S., 109, p. 90, 1893.	Granite.	Dried at 105°. "Altered."
NiO	0.20	Q 26.9 or 26.7 ab 37.2 an 4.4	hy 1.1 il 0.8 hm 1.9	Six miles east of Ironton, Missouri.	W. H. Melville.	E. Haworth, A. R. Mo. G. S., VIII, p. 181, 1895.	Granite.	
NiO	0.02	Q 27.7 or 26.7 ab 35.6 an 2.8	di 2.2 mt 2.8 il 0.5 hm 1.1	Six miles east of Ironton, Missouri.	W. H. Melville.	E. Haworth, A. R. Mo. G. S., VIII, p. 181, 1895.	Quartz-porphyry.	
NiO	0.15	Q 26.6 or 25.0 ab 37.7 an 3.1	di 1.2 hy 0.9 mt 1.2 il 1.1 hm 3.0	Six miles east of Ironton, Missouri.	W. H. Melville.	E. Haworth, A. R. Mo. G. S., VIII, p. 181, 1895.	Quartz-porphyry.	
SO_3 SrO Li_2O	0.05 none none	Q 18.7 or 32.8 ab 38.3	ac 0.9 di 4.0 mt 2.4 il 0.5	Vieja Mountains, San Carlos, Presidio County, Texas.	G. Steiger.	E. C. E. Lord, B. U. S. G. S., 164, p. 92, 1900.	Quartz-pantellerite.	
		Q 25.9 or 33.4 ab 36.7 an 1.4 C 0.6	hy 0.2 mt 1.2 hm 1.1	Mosquez Canyon, Apache Mountains, Transpecos, Texas.	A. Osann.	A. Osann, T. M. P. M., XV, p. 439, 1895.	Paisanite.	
Cl F SrO Li_2O	0.04 none 0.04 none	Q 12.9 or 33.4 ab 46.6	di 2.4 mt 2.1 il 0.5 hm 0.5	Beaver Creek Stock, Bearpaw Mountains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., I, p. 354, 1896.	Quartz-syenite.	
SO_3 Cl F SrO Li_2O	trace 0.03 trace 0.10 trace	Q 20.2 or 27.8 ab 40.9 an 5.0 C 3.5	hy 0.3 mt 0.2 hm 0.4	Antoine Butte, Little Rocky Mountains, Montana.	H. N. Stokes.	Weed and Pirsson, J. G., IV, p. 414, 1896.	Quartz-syenite-porphyry.	Near toscanose.
		Q 31.3 or 27.2 ab 35.6 an 3.1 C 0.6	hy 0.4 mt 0.9	Fourmile Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 120, 1896.	Rhyolite.	
Li_2O	trace	Q 30.6 or 28.4 ab 36.7 an 0.8 C 1.1	hy 0.3 mt 0.5 il 0.5	Fourmile Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 101, 1896.	Quartz-tourmaline-porphyry.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
30	72.88	12.90	0.74	1.05	0.75	0.81	3.72	5.03	1.22			0.45		0.05		99.60	2.64
A2. II	1.215	.126	.005	.015	.019	.014	.060	.054				.006		.001			
31	72.48	13.14	1.66	1.02	0.15	1.04	4.22	4.88	0.42			0.32		trace		99.33	2.62
A2. II	1.208	.129	.010	.014	.004	.019	.068	.052				.004		—			
32	72.38	14.71	1.09	0.82	0.70	0.67	4.28	4.15	0.92			0.10		trace		99.82	2.61
A2. II	1.206	.144	.007	.011	.018	.012	.069	.044				.001		—			
33	71.67	15.82	1.18	0.35	0.13	0.25	4.46	4.45	1.21			0.10		trace		99.62	2.60
A2. II	1.195	.155	.007	.005	.003	.004	.072	.047				.001		—			
34	75.30	11.95	2.17	n. d.	0.05	0.62	3.09	4.96	0.61	0.36	none	0.17	trace	trace	trace	100.17	
A2. II	1.255	.117	.014	(.028)	.001	.011	.050	.054				.002	—	—	—		
35	75.71	11.11	1.56	0.37	0.08	0.88	4.64	4.18	0.35			1.25		0.07		100.20	
A2. II	1.262	.109	.010	.005	.002	.016	.075	.045				.016		.001			
36	74.70	13.72	1.01	0.62	0.14	0.78	3.90	4.02	0.62			none	none	trace		99.91	2.345
A2. II	1.245	.134	.006	.008	.004	.014	.063	.042				—	—	—			
37	70.92	13.24	3.54	0.66	0.23	1.42	4.28	4.25	0.57			0.16	0.18	0.14		100.59	
A2. II	1.199	.130	.022	.010	.006	.025	.069	.046				.002	.001	.002			
38	74.45	14.72	none	0.56	0.37	0.83	3.97	4.53	0.66				0.01	0.28		100.38	
A2. II	1.241	.144	—	.008	.009	.014	.064	.048					—	.004			
39	69.89	17.94	0.39	0.52	0.14	trace	4.21	4.38	2.07				trace	0.23		99.77	2.602
A3. III	1.165	.176	.002	.007	.004	—	.068	.047					—	.003			29°
40	71.56	13.10	0.66	0.28	0.14	0.74	3.77	4.06	5.52					0.16		99.99	
A3. III	1.193	.128	.004	.004	.004	.012	.061	.043						.002			
41	67.13	18.41	0.45	0.07	0.44	0.55	4.17	5.28	2.98			0.30	trace	trace		99.78	
A2. II	1.119	.180	.003	.001	.011	.010	.068	.057				.004	—	—			
42	75.17	12.66	0.23	1.40	0.05	0.82	2.88	5.75	0.66	0.16		0.10	0.03	trace	0.03	100.26	
A1. I	1.253	.124	.001	.019	.001	.014	.047	.062				.001	—	—	—		
43	73.51	13.28	0.94	0.97	0.05	1.11	3.79	5.22	0.62	0.16		0.18	trace	trace	trace	100.38	
A1. I	1.225	.130	.006	.014	.001	.020	.061	.056				.002	—	—	—		
44	70.17	11.83	0.93	none	0.06	0.76	3.85	3.74	8.72			0.17				100.23	2.25
A2. II	1.170	.116	.006		.002	.013	.062	.040				.002					23.5°
45	76.20	13.17	0.34	0.73	0.19	0.42	4.31	4.46	0.33					0.10		100.25	
A3. III	1.270	.129	.002	.010	.005	.007	.069	.048						.001			
46	76.30	12.50	1.47	n. d.	none	0.17	3.86	4.67	0.32	0.18	none	0.05	trace	trace	0.07	99.59	
A2. II	1.272	.122	.009	(.018)	—	.003	.062	.050				.001	—	—	—		

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 28.6 or 30.0 ab 31.4 an 3.3	di 0.4 hy 3.0 mt 1.2	Between Blackhawk and Robinson, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 96, 1896.	Aplitic granite.	
		Q 27.4 or 28.9 ab 35.6 an 2.5	di 0.8 hy 0.8 mt 2.9	Elk Peak, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 84, 1896.	Granite.	Sum low.
Li_2O	trace	Q 28.9 or 24.5 ab 36.2 an 3.3 C 1.9	hy 2.3 mt 1.6	Ridge between Fourmile and Checkerboard Creeks, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 99, 1896.	Quartz-porphyry.	
Li_2O	trace	Q. 28.2 or 26.1 ab 37.7 an 1.1 C 3.3	hy 0.3 mt 1.5	Musselshell River, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 103, 1896.	Quartz-porphyry.	
SO_3 Cl SrO Li_2O Org	0.44 trace none trace 0.45	Q 35.0 or 30.0 ab 26.2 an 3.1 C 0.2	hy 3.5 il 0.3	Red Mountain, Rimini, Butte District, Montana.	H. N. Stokes.	W. H. Weed, B. U. S. G. S., 168, p. 119, 1900.	Rhyolite.	
		Q 32.6 or 25.0 ab 34.1	ac 4.6 di 0.4 wo 1.6 il 0.8 ru 0.9	Great Paint Pots, Yellowstone National Park.	F. A. Gooch.	Hague and Iddings, B. U. S. G. S., 148, p. 131, 1897.	Rhyolite.	TiO_2 high?
FeS_2	0.40	Q 34.9 or 23.4 ab 33.0 an 8.9 C 1.5	hy 0.8 mt 1.4 pr 0.4	Obsidian Cliff, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 7 A. R. U. S. G. S., p. 282, 1888.	Obsidian (black).	
		Q 27.8 or 25.6 ab 36.2 an 4.2	di 1.3 wo 0.5 mt 2.3 hm 1.9	Upper Geyser Basin, Yellowstone National Park.	F. A. Gooch.	J. P. Iddings, M. U. S. G. S., XXXII, p. 426, 1899.	Rhyolite.	
Li_2O	trace	Q 31.4 or 26.7 ab 33.5 an 3.9 C 1.8	hy 2.0	Chalk Mountain, Colorado.	W. F. Hillebrand.	W. Cross, M. U. S. G. S., XII, p. 349, 1886.	Nevadite.	
Li_2O	trace	Q 28.0 or 26.1 ab 35.6 C 6.2	hy 1.1 mt 0.5	Arkansas River, Nathrop, Colorado.	L. G. Eakins.	W. Cross, Pr. Colo. Sc. Soc., II, p. 69, 1887.	Rhyolite.	
		Q 32.5 or 23.9 ab 32.0 an 3.3 C 1.2	hy 0.3 mt 1.0	Fleetwood Tunnel, Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 320, 1896.	Pitchstone.	
		Q 20.3 or 31.7 ab 35.6 an 2.8 C 4.6	hy 1.1 il 0.2 hm 0.5	Knickerbocker Hill, Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 321, 1896.	Andesite.	"Decomposed."
F SrO Li_2O	0.31 trace? trace	Q 33.0 or 34.5 ab 24.6 an 4.2	hy 2.5 mt 0.2	South side Pike's Peak, Colorado.	W. F. Hillebrand.	E. B. Mathews, B. U. S. G. S., 148, p. 160, 1897.	Granitite.	
F SrO Li_2O	0.55 none trace	Q 28.9 or 31.1 ab 32.0 an 3.6	di 1.9 mt 1.4	Middle Beaver Creek, Pike's Peak, Colorado.	W. F. Hillebrand.	E. B. Mathews, B. U. S. G. S., 148, p. 160, 1897.	Granitite.	
		Q 31.8 or 22.2 ab 32.5 an 3.6	hy 0.2 hm 0.9	Near Marysvale, Utah.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 168, 1900.	Rhyolitic glass.	Much H_2O.
		Q 32.5 or 26.7 ab 36.2 an 1.9 C 0.5	hy 1.6 mt 0.5	Obsidian Hill, Tewan Mountains, New Mexico.	L. G. Eakins.	J. P. Iddings, 7 A. R. U. S. G. S., p. 291, 1888.	Obsidian.	
SrO Li_2O	none none	Q 34.6 or 27.8 ab 32.5 an 0.8	hy 2.4	Chilkoot Pass, Alaska.	H. N. Stokes.	J. E. Spurr, A. G., XXV, p. 231, 1900.	Alaskite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
47	75.78	12.39	0.22	1.25	0.31	0.81	4.00	4.64	0.41							99.81	
A3. III	1.263	.121	.010	.018	.008	.014	.064	.050									
48	74.05	13.85	trace	none	0.07	0.90	4.60	4.31	2.20							99.98	
A3. III	1.234	.136	—	—	.002	.016	.074	.046									
49	74.01	12.95	n. d.	1.42	0.48	1.00	5.34	4.65	0.29	—		0.24	0.01	trace		100.46	
A3. III	1.234	.127	(.008)	(.003)	.012	.018	.085	.050				.003	—	—			
50	75.23	12.36	0.96	1.24	0.01	1.00	4.00	4.62	0.73				0.27			100.42	
A3. III	1.254	.121	.006	.017	—	.018	.064	.049					.002				
51	72.15	13.50	3.12	n. d.	0.16	0.93	4.20	4.54	0.85			0.45				99.90	
A3. III	1.203	.132	.020	(.040)	.004	.016	.068	.048				.006					
52	74.40	13.91	1.39	n. d.	0.28	0.61	4.65	4.36	0.65							100.25	
A3. III	1.240	.136	.009	(.018)	.007	.011	.075	.047									
53	76.05	11.68	0.34	1.05	0.29	0.42	3.79	5.09	1.36			0.05		trace		100.54	2.636
A2. II	1.268	.114	.002	.015	.007	.008	.060	.054				.001		—			
54	71.49	15.33	2.15	n. d.	none	0.30	4.32	5.86	0.54			0.45		trace		100.44	
A3. III	1.192	.150	.014	(.028)	—	.005	.070	.062				.006		—			
55	69.00	13.95	1.56	2.38	0.14	0.49	5.67	5.11	0.70			0.35		0.55		99.95	
A2. II	1.150	.137	.010	.033	.004	.009	.091	.054				.004		.008			
56	68.95	14.00	2.12	3.56	0.07	0.23	5.45	5.29	0.05			0.35		0.55		100.62	
A2. II	1.149	.137	.013	.049	.002	.004	.088	.056				.004		.008			
57	66.40	17.37	4.30	0.50	0.20	0.75	3.88	4.39	0.50			1.00		0.11		99.40	
B2. III	1.107	.170	.027	.007	.005	.014	.063	.047				.012		.001			
58	76.64	13.50	0.50	n. d.	0.12	0.65	3.48	5.51	n. d.							100.40	
A3. III	1.244	.132	.003	(.006)	003	.011	.056	.059									
59	72.78	12.79	2.57	1.73	0.27	0.64	3.17	5.16	0.55			0.50		0.18		100.34	
A2. II	1.213	.125	.016	.024	.007	.012	.051	.056				.006		.003			
60	72.22	14.80	0 96	0.80	0.33	0.74	4.16	5.16	0.71			0.57		0.13		100.58	
A2. II	1.204	.145	.006	.011	.008	.013	.067	.056				.007		.002			
61	71.25	13.90	1.28	1.24	0.45	0.97	3.29	6.28	0.83	—		0.32		trace		99.81	
A2. II	1.188	.136	.008	.017	.011	.018	.053	.067				.004		—			
62	69.73	13.02	2.28	1.92	0.21	1.16	3.08	5.78	1.94	0.38		0.29		trace		99.79	
A2. II	1.162	.127	.014	.027	.005	.021	.050	.062				.004		—			
63	71.51	12.82	2.09	1.40	0.17	1.09	4.24	4.52	1.23			0.10	trace			99.17	
B2. III	1.192	.125	.013	.019	.004	.020	.068	.048				.001	—				
64	76.03	11.76	1.99	n. d.	0.27	0.45	3.36	5.61	0.63							100.10	
A3. III	1.267	.115	.013	(.026)	.007	.008	.054	.060									

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 32.5 or 27.8 ab 33.5 an 1.9	di 1.6 hy 1.1 mt 2.3	Mono Lake, California.	W. H. Melville.	W. Lindgren, B. U. S. G. S., 150, p. 151, 1898.	Rhyolite-obsidian.	
		Q 28.8 or 25.6 ab 38.8 an 4.4	hy 0.2	Mono Craters, California.	T. M. Chatard.	I. C. Russell, 8 A. R. U. S. G. S., p. 380, 1888.	Rhyolite.	Scoriaceous.
Cl	0.07	Q 24.6 or 27.8 ab 40.3	ac 3.7 di 3.3 il 0.5	Clear Lake, California.	W. H. Melville.	G. F. Becker, M. U. S. G. S., XIII, p. 154, 1888.	Andesite-obsidian.	
		Q 32.3 or 27.2 ab 33.5 an 2.2	di 2.7 mt 1.4	Cerro de los Navajos, n. Tulacingo, Mexico.	F. Baerwald.	C. A. Tenne, Z. D. G. G., XXXVII, p. 616, 1885.	Obsidian.	Cf. No. 11, kallerudose.
		Q 26.2 or 26.7 ab 35.6 an 4.4	hy 5.0 il 0.9	Mafalidh, Snäffels Penins., Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 651, 1891.	Granophyre.	
		Q 27.8 or 26.1 ab 39.3 an 2.8 C 0.4	hy 3.1	Pelvoux, France.	P. Termier?	P. Termier, C. R., CXXIV, p. 318, 1897.	Granite.	
ZrO_2 F Li_2O	0.42 trace trace	Q 33.4 or 30.0 ab 31.4	di 2.0 hy 1.5 mt 0.5	Drammen, Norway.	P. Jannasch.	H. O. Lang, Nyt Mag., XXX, p. 40, 1886.	Quartz-porphyry.	ZrO_2 high?
		Q 22.1 or 34.5 ab 36.7 an 1.4 C 1.3	hy 3.2 il 0.9	Gislerud, Norway.	R. Mauzelius.	W. C. Brögger, Z. K., XVI, p. 46, 1890.	Quartz-porphyry.	
		Q 15.4 or 30.0 ab 43.5	ac 3.7 di 2.2 hy 2.9 mt 0.5 il 0.6	Frön, Christiania, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 139, 1894.	Quartz-lindoite.	Center of dike. Near kallerudose.
		Q 15.0 or 31.1 ab 42.4	ac 3.2 di 0.9 hy 5.6 mt 1.4 il 0.6	Frön, Christiania, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 139, 1894.	Arfvedsonite-grorudite.	Border of dike.
		Q 25.1 or 26.1 ab 33.0 an 2.5 C 4.7	hy 0.5 tn 1.0 il 1.1 hm 4.3	Fjelebua, Norway.	G. Särnström.	W. C. Brögger, Z. K., XVI, p. 46, 1890.	Quartz-syenite-porphyry.	Al_2O_3, Fe_2O_3, and TiO_2 high?
		Q 31.4 or 32.8 ab 29.3 an 3.1 C 0.6	hy 1.0	Arild, Kullen, Sweden.	A. Hennig.	A. Hennig, Act. Univ. Lund, XXXIV, 1898.	Granitite.	
		Q 32.4 or 31.1 ab 26.7 an 3.1 C 0.8	hy 1.0 mt 3.7 il 0.9	Storholm, n. Rödö, Sweden.	H. Santesson.	P. J. Holmquist, Afh. Sver. G. Und., No. 181, p. 38, 1899.	Felsite-porphyry.	
		Q 25.9 or 31.1 ab 35.1 an 3.6 C 0.9	hy 0.8 mt 0.9 il 1.1	Storholm, n. Rödö, Sweden.	H. Santesson.	P. J. Holmquist, Afh. Sver. G. Und., No. 181, p. 51, 1899.	Quartz-porphyry.	
		Q 25.1 or 37.3 ab 27.8 an 4.4	di 0.4 hy 1.4 mt 2.5	Rödö, Sweden.	N. Sahlbom.	P. J. Holmquist, Afh. Sver. G. Und., No. 181, p. 25, 1899.	Rapakiwi granite-porphyry.	Dried at 100°.
		Q 26.3 or 34.5 ab 26.2 an 4.2	di 1.5 hy 1.0 mt 3.2 il 0.6	Gorgvik, Sweden.	N. Sahlbom.	P. J. Holmquist, Afh. Sver. G. Und., No. 181, p. 34, 1899.	Felsite-porphyry.	
		Q 27.5 or 26.7 ab 35.6 an 2.5	di 2.5 mt 3.0	Säterstugen, Brefven, Sweden.	K. Winge.	K. Winge, G. F. F., XVIII, p. 195, 1896.	Granite.	Sum low.
		Q 32.5 or 33.4 ab 28.3 an 0.3	di 1.7 hy 3.3	Thal, Thüringerwald, Baden.	Not stated.	K. Futterer, M. Bad. G. L-A., II, p. 58, 1893.	Quartz-porphyry.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
65	70.85	15.79	1.20	1.27	trace	0.26	3.37	6.69	0.89		trace	0.22	trace			100.60	2.599
A2. II	1.181	.155	.007	.018	—	.005	.955	.071				.003	—				
66	66.28	16.64	1.18	1.68	0.84	0.52	3.91	6.43	1.45		0.17	0.61	0.17			100.01	2.589
A2. II	1.105	.163	.007	.024	.021	.009	.063	.068				.008	.001				
67	68.60	16.76	0.93	0.52	0.79	0.86	4.49	6.46	0.78							100.19	2.602
A3. III	1.143	.164	.006	.007	.020	.015	.072	.069									
68	75.97	10.84	n. d.	2.03	0.16	1.01	4.23	4.91	0.49							99.64	
A3. III	1.266	.106	(.014)	.028	.004	.018	.068	.052									
69	73.77	14.13	0.80	0.75	0.27	0.35	2.75	5.99	1.29			0.10	0.18			100.46	2.622
A2. II	1.230	.138	.005	.010	.007	.006	.044	.064				.001	.001				
70	74.97	12.58	0.26	1.41	0.10	0.93	2.75	5.74	0.52			0.26	trace			99.52	2.605
A2. II	1.250	.123	.002	.019	.003	.016	.044	.061				.003	—				
71	74.03	13.87	0.09	0.95	0.15	0.30	3.71	6.14	1.17			trace	0.27			100.68	2.662
A2. II	1.234	.136	.001	.013	.004	.005	.059	.065				—	.002				
72	72.68	16.10	2.19	n. d.	0.21	0.58	3.39	4.46	0.52							100.13	
A4. IV	1.211	.158	.014	(.028)	.005	.010	.055	.048									
73	67.04	16.00	2.11	1.55	0.69	1.00	4.65	5.49	1.53		none	0.92				100.95	
A2. II	1.117	.157	.013	.022	.017	.018	.075	.059				.011					
74	74.76	11.60	3.50	0.19	0.18	0.07	4.35	4.92	0.64			trace	trace			100.21	
A3. III	1.246	.114	.022	.003	.005	.001	.070	.052				—	—				
75	74.37	12.65	2.58	n. d.	0.20	1.22	3.87	4.57	0.22	0.02						99.70	
A4. IV	1.240	.124	.016	(.032)	.005	.021	.063	.049									
76	75.06	11.70	1.04	1.57	0.19	1.01	2.56	6.25	0.63			0.36				100.37	
A3. III	1.251	.115	.006	.022	.005	.018	.041	.067				.004					
77	74.57	12.58	2.77	n. d.	0.30	0.35	3.98	3.70	1.04							99.29	
B4. V	1.243	.123	.017	(.034)	.008	.006	.064	.040									
78	76.82	12.46	1.06	n. d.	0.05	1.35	2.85	5.71	0.24							100.54	
A3. III	1.280	.122	.007	(.014)	.001	.024	.046	.061									
79	76.01	11.96	2.06	n. d.	trace	0.26	4.46	4.73	0.28					trace		99.76	2.58
A3. III	1.267	.117	.013	(.016)	—	.004	.072	.050						—			
80	75.74	12.45	1.02	n. d.	0.08	1.00	2.91	6.77	0.33	—						100.30	
A3. III	1.262	.122	.006	(.012)	.002	.018	.047	.072									
81	74.12	12.39	0.31	0.21	0.42	0.30	3.22	5.07	2.17	2.22				trace	trace	100.33	
A3. III	1.235	.121	.002	.003	.011	.005	.052	.055						—	—		

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3	0.06	Q 24.4 or 39.5 ab 28.8 an 1.4 C 2.4	hy 1.1 mt 1.6 il 0.5	Tanngrund, Schleuse Thal, Thüringerwald, Baden.	Schade.	H. Loretz, Jb. Pr. G. L-A., IX, p. 295, 1889.	Quartz-porphyry.	SO_3 for S.
SO_3	0.13	Q 16.3 or 37.8 ab 33.0 an 2.5 C 2.3	hy 3.3 mt 2.9	Schleuse River, Thüringerwald, Baden.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L-A., IX, p. 290, 1889.	Granite-porphyry.	SO_3 for S.
		Q 15.2 or 37.8 ab 37.7 an 4.2 C 0.8	hy 2.0 mt 1.5	Gierniger Loch, Baden.	M. Dittrich.	F. Schalck, Sp. Kte., Baden, Bl. Petersthal, p. 33, 1895.	Granite.	Center of dike; cf. No. 2, SR 2 of dacase.
		Q 28.1 or 28.9 ab 35.6	ac 5.5 di 0.9 wo 1.6	New Dreibrunnen, Odenwald, Hesse.	F. Kutscher.	C. Chelius, Not. bl. Ver. Erdk., XIII, p. 8, 1892.	Aplite.	
SO_3	0.08	Q 33.5 or 35.6 ab 23.1 an 1.7 C 2.4	hy 1.4 mt 1.2	Magdeburg, Prussia.	Fischer.	F. Klockmann, Jb. Pr. G. L-A., XI, p. 186, 1892.	Quartz-porphyry breccia.	SO_3 for S.
SO_3	trace	Q 34.1 or 33.9 ab 23.1 an 4.4 C 0.2	hy 2.5 mt 0.5 il 0.5	Meineckenberg, Harz Mountains.	Hampe.	K. A. Lossen, Z. D. G. G., XL, p. 204, 1888.	Granite-porphyry.	SO_3 for S.
F Li_2O Cu	trace trace trace	Q 27.8 or 36.1 ab 30.9 an 1.4 C 0.7	hy 2.1 mt 0.2	Kleiner Kornberg, Erzgebirge.	A. Böttger.	F. Sandberger, Sb. Münch. Ak, XVIII, p. 466, 1888.	Lithionite-granite.	
		Q 32.4 or 26.7 ab 28.8 an 2.8 C 4.6	hy 4.2	Veitsberg, Karlsbad, Bohemia.	A. Schwager.?	Schwager and V. Gümbel, Geogn. Jhft., VII, p. 69, 1895.	Granite.	
		Q 15.6 or 32.8 ab 39.3 an 5.0 C 0.5	hy 1.7 mt 2.8 il 1.5	Käserngrat, Windgälle Mountains, Switzerland.	C. Schmidt.	C. Schmidt, N. J. B. B., III, p. 432, 1886.	Porphyry.	
		Q 31.6 or 28.9 ab 32.0	ac 4.2 hy 0.5 mt 0.7 hm 1.6	Comende, San Pietro Island, Sardinia.	M. Dittrich.	H. Rosenbusch, Elemente, p. 257, 1898.	Comendite.	
		Q 29.9 or 27.2 ab 33.0 an 3.3	di 2.2 hy 3.6	Forgia Vecchia, Lipari, Aeolian Islands.	F. Glaser.	A. Bergeat, Abh. Münch. Ak., XX, p. 111, 1899.	Obsidian.	
		Q 33.7 or 37.3 ab 21.5 an 1.9	di 2.5 hy 1.3 mt 1.4 il 0.6	Hogland Island, Finland.	V. Ungern-Sternberg.	V. Ungern-Sternberg, In. Diss. Leipzig, 1882.	Rapakiwi-granite.	Cf. W. Ramsay, G. F. F., XII, p. 481, 1890.
		Q 33.8 or 22.2 ab 33.5 an 1.7 C 1.8	hy 5.3	N. of Kamary, Crimea, Russia.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 448, 1887.	Dacite.	
		Q 35.0 or 38.9 ab 24.1 an 4.2	di 2.3 hy 0.9	Cap Marsa. N. Ménerville, Algeria.	Not stated.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, p. 77, 1900.	Liparite.	
		Q 31.5 or 27.8 ab 35.1	ac 2.3 di 1.0 hy 1.6	Mount Scholoda, Abyssinia.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 264, 1900.	Paisanite.	
		Q 30.8 or 40.0 ab 24.6 an 0.8	di 3.6	Ensay, Omeo, Victoria.	A. W. Howitt.	A. W. Howitt, T. R. Soc. Vict., XXII, p. 97, 1886.	Aplite.	Dried at 100°.
SO_3	trace	Q 34.3 or 30.6 ab 27.2 an 1.4 C 0.9	hy 1.2 mt 0.5	Wantialable Creek, County Gowen, New South Wales.	J. C. H. Mingaye.	G. W. Card, Rec. G. S. N. S. W., IV, p. 116, 1895.	Trachyte.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	76.34	11.60	2.41	0.30	0.06	0.55	5.50	2.75	0.39	0.10	trace	0.26	trace	trace	0.09	100.35	
A1. I	1.272	.114	.015	.004	.002	.010	.089	.029				.003	—	—	.001		
2	72.56	12.33	0.80	0.82	trace	trace	5.36	3.08	4.59			0.20		trace		99.74	
A2. II	1.209	.121	.005	.012	—	—	.087	.032				.003		—			
3	75.92	12.96	0.33	1.40	trace	0.15	4.60	4.15	0.32	0.16	0.03	0.05	trace	0.04	trace	100.23	
A1. I	1.265	.127	.002	.019	—	.003	.074	.044				.001	—	—			
4	66.90	14.86	0.93	3.41	0.31	1.23	5.56	5.02	0.31	0.16		0.43	0.12	0.15	0.14	100.59 0.42	
A1. I	1.115	.146	.006	.048	.008	.021	.090	.053				.005	.001	.002	.001	100.17	
5	68.40	17.99	2.66	1.63	0.49	0.67	4.54	3.54	0.52					0.21		100.65	
A3. III	1.140	.175	.017	.022	.012	.012	.073	.037						.003			
6	75.64	12.68	1.07	n. d.	trace	0.83	4.98	3.51	1.58							100.29	
A3. III	1.261	.124	.007	(.014)	—	.014	.080	.037									
7	67.23	14.70	2.85	1.15	1.39	2.91	6.89	1.70	0.79	—	trace	0.08	trace	.012	none	99.89	
A1. I	1.121	.144	.018	.017	.035	.051	.111	.018				.001	—	.002			
8	72.70	13.79	1.01	n. d.	0.65	2.07	4.93	4.33	1.10							100.48	
A3. III	1.212	.135	.006	(.012)	.016	.038	.079	.046									
9	73.81	13.72	1.59	n. d.	0.23	0.61	5.29	4.09	—			0.97				100.31	
A3. III	1.230	.135	.010	(.014)	.006	.011	.085	.043				.012					
10	71.14	12.98	3.35	n. d.	0.34	1.10	4.97	3.84	0.82			0.48				99.02	
B4. V	1.186	.127	.021	(.042)	.009	.020	.080	.040				.006					
11	69.81	13.85	3.21	n. d.	0.43	1.38	5.56	4.40	n. d.			1.06				99.70	
A4. IV	1.164	.135	(.002)	(.036)	.011	.025	.090	.047				.013					
12	67.91	15.17	3.92	n. d.	0.55	1.59	5.36	4.52	n. d.			0.53				99.55	
A4. IV	1.132	.148	.019	(.038)	.014	.029	.087	.048				.007					
13	71.60	13.60	2.40	n. d.	0.21	2.30	5.55	3.53	0.70							99.89	
A4. IV	1.193	.133	.015	(.030)	.005	.041	.089	.037									
14	71.65	13.04	2.79	1.80	trace	trace	6.30	3.98	1.10			trace		trace		100.66	
A3. III	1.194	.128	.018	.025	—	—	.102	.042				—		—			
15	71.35	12.21	4.53	1.14	trace	0.22	6.51	3.22	0.33			0.50		0.78		100.79	
A2. II	1.189	.120	.028	.014	—	.004	.105	.034				.006		.011			
16	73.63	12.89	n. d.	2.46	0.57	1.37	5.28	3.67	0.81							100.68	
A4. IV	1.227	.126	—	.034	.014	.025	.085	.039									
17	72.11	15.85	1.63	n. d.	0.69	0.83	4.85	4.23	0.68							100.87	2.624
B3. IV	1.202	.155	.010	(.020)	.017	.014	.078	.045									
18	73.46	12.47	3.64	n. d.	trace	0.32	5.63	4.03	0.44					trace		99.99	2.58
A3. III	1.224	.122	(.010)	(.024)		.005	.090	.042						—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. KALLERUDOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO Li_2O	none none	Q 33.6 or 16.1 ab 44.5	ac 1.8 di 0.4 wo 1.0 mt 0.2 il 0.5 hm 2.2	Monterey, Franklin County, Pennsylvania.	H. N. Stokes.	F. Bascom, B. U. S. G. S., 150, p. 348, 1898.	Aporhyolite.	
		Q 29.5 or 17.8 ab 45.6 C 0.2	hy 0.5 mt 1.2 il 0.5	Checkerboard Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 125, 1896.	Rhyolite.	
F SrO Li_2O	0.12 none trace	Q 32.0 or 24.5 ab 38.8 an 0.8 C 0.6	hy 2.2 mt 0.2	Near Florissant, Pike's Peak District, Colorado.	W. F. Hillebrand.	E. B. Mathews, B. U. S. G. S., 148, p. 160, 1897.	Granitite.	
F SrO Li_2O	1.00 none 0.06	Q 12.5 or 29.0 ab 47.2 an 0.6	hy 5.7 mt 1.4 il 0.8 ft 1.8	N. of Twin Creek, Pike's Peak, Colorado.	W. F. Hillebrand.	E. B. Mathews, B. U. S. G. S., 148, p. 160, 1897.	Granite-gneiss.	Near liparose.
		Q 26.3 or 20.6 ab 38.3 an 3.3 C 5.4	hy 1.9 mt 3.9	San Mateo Mountain, Mount Taylor Region, New Mexico.	T. M. Chatard.	B. U. S. G. S., 148, p. 185, 1897.	Lava.	
		Q 31.4 or 20.6 ab 41.9 an 1.9	di 1.7 hy 0.9	Cerro de los Navajos, n. Tulancingo, Mexico.	F. Baerwald.	C. A. Tenne, Z. D. G. G., XXXVII, p. 616, 1885.	Obsidian.	Cf. No. 50, liparose.
ZrO_2 Cl FeS_2 CoO Cu	none 0.02 0.02 none 0.04	Q 14.8 or 10.0 ab 58.2 an 4.2	di 7.6 mt 4.0	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. Contr.	Pyroxene-granitite.	Near noyangose.
		Q 22.0 or 25.6 ab 41.4 an 2.8	di 7.7	Cerro del Quinche, Quito, Ecuador.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 444, 1887.	Obsidian.	
		Q 24.8 or 23.9 ab 44.5	ac 4.6 hy 0.8 il 1.9	Raudhfossafjöll, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 657, 1891.	Liparite.	
		Q 23.6 or 22.2 ab 41.9 an 1.9	di 3.2 hy 4.0 il 0.9	Raudhfossafjöll, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 658, 1891.	Obsidian.	Sum low.
		Q 17.2 or 26.1 ab 46.1	ac 0.9 di 5.9 hy 1.1 il 2.0	Domadalshraun, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 643, 1891.	Liparite.	
		Q 14.1 or 26.7 ab 45.6 an 3.6	di 3.8 hy 3.5 il 1.1	Langahraun, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 646, 1891.	Liparite.	
		Q 21.3 or 20.6 ab 46.6 an 1.9	di 8.3	Carrock Fell, England.	G. Barrow.	A. Harker, Q. J. G. S., LI, p. 129, 1895.	Granophyre.	
		Q 20.3 or 23.4 ab 45.1	ac 7.4 hy 3.0 mt 0.5	Hougnatten, Sandsvär Parish, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 127, 1894.	Soda-granite.	
		Q 21.5 or 21.7 ab 45.1	ac 8.8 wo 0.4 mt 3.0	Kallerud, Svarstad Parish, Laugenthal, Norway.	L. and V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 48, 1894.	Grorudite.	MnO high? Near pantellerose.
		Q 24.1 or 21.7 ab 44.5 an 0.6	di 5.6 hy 3.1	Ornö, Sweden.	R. Mauzelius.	A. Cederström, G. F. F., XV, p. 111, 1893.	Granite.	
		Q 23.9 or 25.0 ab 40.9 an 3.9 C 1.8	hy 4.4	Griesbach, Petersthal, Baden.	Thürach.	F. Schalch, Sp. Kte. Baden, Bl. Petersthal, p. 31, 1895.	Granite.	
		Q 25.4 or 23.4 ab 41.9	ac 4.6 di 1.3 hy 2.7	Amba Subhat, Abyssinia.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 262, 1900.	Grorudite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
19	72.71	12.80	2.64	1.48	0.10	0.58	6.50	3.87	0.48					trace		101.16	
B3. IV	1.212	.125	.016	.021	.003	.010	.105	.041						—			
20	70.99	14.84	3.76	0.35	0.14	0.60	5.94	2.40	0.40					trace		99.42	
B3. IV	1.183	.145	.024	.005	.004	.011	.096	.025						—			

RANG 1. PERALKALIC. LIPARASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	74.78	14.56	3.04	n. d.	trace	0.69	6.02	0.59	0.42							100.10	2.64
A4. IV	1.246	.143	.019	(.038)	—	.012	.097	.006									
2	75.46	13.18	0.91	n. d.	0.10	0.95	6.88	1.09	0.93							99.91	2.42
A3. III	1.258	.129	.006	(.012)	.003	.017	.111	.012									
3	77.29	14.62	trace	n. d.	0.38	trace	7.60	0.16	0.57							100.62	
A3. III	1.288	.143	—	—	.010	—	.122	.002									
4	72.50	17.00	1.17	n. d.	0.74	0.20	6.28	0.77	1.62							100.28	
A3. III	1.208	.167	.007	(.014)	.019	.003	.101	.008									
5	71.20	17.60	1.74	n. d.	1.17	0.76	6.20	0.85	1.37							100.89	
A3. III	1.187	.172	.011	(.022)	.029	.014	.100	.009									
6	68.04	16.14	4.32	0.97	1.02	0.32	7.62	0.58	1.27							100.28	
A3. III	1.134	.158	.027	.014	.026	.005	.122	.006									
7	72.34	14.07	2.92	n. d.	1.27	0.41	6.28	1.13	1.41							99.83	
A4. IV	1.206	.138	.018	(.036)	.032	.007	.101	.012									
8	77.66	12.30	0.61	0.17	0.73	0.16	6.96	0.19	0.46	0.33			trace			99.57	2.634
A3. III	1.294	.128	.004	.003	.018	.003	.112	.002					—				
9	72.39	14.42	0.56	0.30	1.85	0.85	5.93	1.23	1.13	0.55			trace			99.22	2.632
A3. III	1.207	.141	.004	.004	.046	.016	.095	.013					—				
10	78.77	12.44	0.95	n. d.	0.02	0.53	6.79	0.24	0.26	0.14						100.14	2.614
A3. III	1.313	.122	.006	(.012)	.001	.010	.110	.002									

RANG 2. DOMALKALIC. TOSCANASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	68.55	16.46	0.85	0.56	0.17	4.17	1.92	5.59	n. d.			0.35		0.52		101.03 0.80 100.23	
A2. II	1.143	.161	.005	.008	.004	.075	.030	.060				.004		.007			
2	68.36	13.24	1.29	3.39	1.15	2.51	2.05	5.34	2.63					0.27		100.23	
A3. III	1.139	.130	.008	.048	.029	.045	.033	.057						004			
3	69.21	15.59	1.08	1.29	0.11	1.30	1.69	8.92	0.75							99.94	
A3. III	1.154	.152	.007	.019	.003	.023	.027	.094									

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 2. DOPOTASSIC. DELLENOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 21.6 or 40.0 ab 17.3 an 7.5 C 1.7	hy 8.6 mt 0.9	Der Gabel, Münsterthal, Schwarzwald, Baden.	Bunsen's Laboratory.	A. Schmidt, Cf. N. J., 1889, I, p. 95.	Porphyry.	
		Q 23.0 or 33.9 ab 18.3 an 7.0 C 4.8	hy 8.7 mt 1.9	Brandenberg, Münsterthal, Schwarzwald, Baden.	Bunsen's Laboratory.	A. Schmidt, Cf. N. J., 1889, I, p. 95.	Porphyry.	
		Q 21.7 or 39.8 ab 17.3 an 10.8 C 1.1	hy 5.1 mt 1.9	Mte. Cucco, Cerveteri, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 49, 1897.	Toscanite.	
		Q 19.9 or 36.1 ab 18.9 an 14.5 C 0.4	hy 6.0 mt 1.6	Castle Hill, Tolfa, Italy.	H. S. Washington.	H. S. Washington, J. G., V., p. 49, 1897.	Toscanite.	Sum low.

SUBRANG 3. SODIPOTASSIC. TOSCANOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 22.9 or 41.7 ab 26.2 an 5.0 C 0.2	hy 3.3	Taggart Bay, Lake Keepawa, Quebec.	F. G. Wait.	G. C. Hoffmann, A. R. G. S. Can., IX, p. 18 R, 1898.	Granitite-gneiss.	
		Q 20.7 or 25.6 ab 32.0 an 9.2 C 4.0	hy 8.3	Lake Wicksteed, Quebec.	F. G. Wait.	G. C. Hoffmann, A. R. G. S. Can., IX, p. 19 R, 1898.	Granite-gneiss.	
		Q 19.7 or 35.6 ab 25.7 an 6.4 C 4.1	hy 3.1 mt 0.5 hm 4.3	Pemigewasset, New Hampshire.	L. G. Eakins.	B. U. S. G. S. 148, p. 67, 1897.	Quartz-porphyry.	
ZrO_2 Cl FeS_2 NiO	0.03 0.05 0.19 none	Q 11.7 or 30.6 ab 38.8 an 8.9	di 2.7 hy 2.2 mt 2.6 il 1.5	Mt. Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S. 148, p. 69, 1897.	Diorite.	
		Q 19.6 or 29.5 ab 32.5 an 8.6	hy 8.8 mt 0.9	Squam Light, Cape Ann, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 109, 1899.	Quartz-syenite-porphyry.	
		Q 18.2 or 31.1 ab 33.5 an 9.2 C 1.0	hy 6.2 mt 1.4	Wolf Hill, n. Gloucester, Essex Co., Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VI, p. 800, 1898.	Nordmarkite.	
		Q 15.2 or 32.2 ab 34.1 an 7.0	di 3.4 hy 5.0 mt 1.6 il 1.3	Gloucester, Essex Co., Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VI, p. 798, 1898.	Akerite.	Dried at 110°.
		Q 30.4 or 22.2 ab 29.9 an 10.3	di 0.9 hy 1.6 mt 2.6 il 0.5	Conanicut Island, Rhode Island.	L. V. Pirsson.	L. V. Pirsson, A. J. S., XLVI, p. 373, 1893.	Granite.	
S	0.63	Q 18.5 or 31.5 ab 35.1 an 7.0	di 0.8 mt 2.1 hm 1.6	Millstone Point, Connecticut.	H. T. Vulté.	J. F. Kemp, B. G. S. A., X, p. 375, 1899.	Granite.	
		Q 28.7 or 25.6 ab 33.0 an 8.3 C 0.9	hy 2.1 mt 0.9	Guilford, Howard Co., Maryland.	W. F. Hillebrand.	G. H. Williams, 15 A. R. U. S. G. S., p. 672, 1895.	Granite.	Dried at 100°.
		Q 28.7 or 28.4 ab 26.2 an 12.5	hy 2.6 mt 1.2	Woodstock, Baltimore Co., Maryland.	W. F. Hillebrand.	G. H. Williams, 15 A. R. U. S. G. S., p. 672, 1895.	Biotite-granite.	Dried at 100°.
		Q 26.8 or 21.1 ab 32.0 an 13.1 C 1.1	hy 4.7 mt 1.2	Dorsey Run Cut, Howard Co., Maryland.	W. F. Hillebrand.	C. R. Keyes. 15 A. R. U. S. G. S., p. 697, 1895.	Biotite-granite.	Dried at 100°.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
13	69.56	15.52	1.67	1.19	0.41	1.20	4.46	4.68	0.67	0.34	none	0.31	0.08	0.07	0.10	100.26	
A1. I	1.159	.152	.010	.017	.010	.021	.072	.050				.004	.001	.001	.001		
14	67.98	14.84	1.00	3.15	0.91	2.17	2.66	4.76	0.49	0.14	none	0.84	0.34	trace	0.20	99.77	
A1. I	1.133	.146	.006	.044	.023	.039	.043	.051				.010	.002	—	.001		
15	69.69	15.64	0.90	1.62	0.66	1.22	3.34	5.30	n. d.			0.29				98.66	
A3. III	1.162	.153	.006	.022	.017	.021	.054	.057				.004					
16	66.69	16.69	2.06	0.93	1.15	1.40	2.46	5.23	1.70	—	1.42					99.73	
A3. III	1.112	.163	.013	.013	.029	.025	.040	.056									
17	66.10	20.82	1.52	2.17	0.95	1.57	2.94	3.48	0.54							100.09	
A3. III	1.102	.204	.009	0.30	.024	.029	.047	.037									
18	74.00	12.04	0.78	2.61	0.42	0.85	3.47	4.33	0.86	—		0.34	0.06	0.05	0.12	99.93	2.565
A1. I	1.233	.118	.005	.036	.011	.015	.056	.044				.004	—	.001	.001		
19	69.94	15.19	1.88	0.60	0.92	1.15	3.95	4.29	0.85	0.14		0.25	0.13	0.03		99.32	
B2. III	1.166	.149	.012	.008	.023	.021	.064	.046				.003	.001	—			
20	74.37	13.12	0.73	0.87	0.35	1.26	2.57	6.09	0.25	0.05		0.29	0.06	trace	0.10	100.11	
A1. I	1.246	.128	.005	.011	.009	.022	.042	.065				.004	—	—	—		
21	64.49	17.25	0.86	2.42	1.24	3.79	4.19	4.15	0.54	0.06		0.51	0.23	trace	0.30	100.11	
A. I	1.075	.169	.005	.034	.031	.067	.068	.044				.006	.002	—	.002		
22	73.12	14.27	0.51	0.26	0.24	1.10	3.43	4.90	0.73	0.68	0.77	0.08	0.03	0.06	trace	100.18	
A1. I	1.219	.140	.003	,004	.006	.020	.055	.052				.001	—	.001	—		
23	69.68	14.97	0.79	0.34	0.66	2.10	3.38	4.40	0.92	1.10	0.88	0.28	0.17	trace	0.14	99.86	
A1. I	1.161	.147	.005	.005	.016	.038	0.55	0.47				.004	.001	—	.001		
24	68.60	16.13	2.22	0.44	0.72	1.36	4.37	4.89	0.58	0.20		0.32	0.18	trace	0.27	100.37	
A1. I	1.143	.158	.014	.005	.018	.024	.071	.053				.004	.001	—	.002		
25	67.44	15.78	1.58	0.85	1.43	2.38	4.11	4.87	0.70	0.32		0.32	0.21	trace	0.24	100.32	
A1. I	1.124	.154	.010	.012	.036	.043	.066	.052				.004	.001	—	.002		
26	67.04	15.25	1.69	1.13	1.75	2.17	4.09	5.10	0.56	0.51		0.20	0.21	0.05	0.33	100.11	
A1. I.	1.117	.150	.011	.015	.049	.039	.066	.055				.003	.001	.001	.002		
27	66.29	15.09	1.37	1.17	2.39	2.38	3.96	4.91	0.60	0.39	0.45	0.27	0.15	0.06	0.30	99.85	
A1. I	1.105	.148	.009	.017	.060	.043	.064	.052				.003	.001	.001	.002		
28	64.64	16.27	2.42	1.58	1.27	2.65	4.39	4.98	0.27	0.09	0.37	0.51	none	trace	0.18	100.12	
A1. I	1.078	.160	.015	.022	.032	.048	.071	.054				.006	—	—	.001		
29	69.95	15.14	0.38	0.83	0.56	1.45	2.70	6.36	0.91	0.40	0.37	0.24	0.10	0.08	0.13	100.06	
A1. I	1.166	.148	.002	.011	.014	.026	.043	.068				.003	.001	.001	.001		

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
S SrO Li_2O	trace trace trace	Q 22.3 or 27.8 ab 37.7 an 5.8 C 0.9	hy 1.4 mt 2.3 il 0.6	Monterey Mt., Virginia.	W. F. Hillebrand.	Darton and Keith, A. J. S., VI, p. 307, 1898.	Felsophyre.	
SO_3 Cl F S SrO Org.	trace trace trace 0.08 trace 0.21	Q 26.4 or 28.4 ab 22.5 an 10.8 C 1.3	hy 6.0 mt 1.4 il 1.5	Near Rowland, Bartow Co., Georgia.	H. N. Stokes.	A. H. Brooks, B. U. S. G. S. 168, p. 55, 1900.	Augite-microcline-granite.	Org. =graphite.
		Q 25.5 or 31.7 ab 28.3 an 5.8 C 2.1	hy 3.3 mt 1.4 il 0.6	Felch Mountain, Michigan.	H. N. Stokes.	H. L. Smith, M.U.S.G.S., XXXVI, p. 389, 1899.	Granite.	Sum low because H_2O not determined.
		Q 27.4 or 31.1 ab 21.0 an 7.0 C 4.3	hy 2.9 mt 3.0	Upper Quinnesec Falls, Menominee River, Wisconsin.	R. B. Riggs.	G. H. Williams, B. U. S. G. S. 62, p. 121, 1890.	Quartz-porphyry.	Dried at 105°.
		Q 29.7 or 20.6 ab 24.6 an 8.1 C 9.3	hy 5.2 mt 2.1	Athelstane, Wisconsin.	W. W. Daniells.	E. R. Buckley, B. IV. G. Nh. S. Wis., p. 148, 1898.	Granite.	Al_2O_3 high?
Cl Li_2O	trace trace	Q 33.2 or 25.6 ab 29.3 an 4.2	hy 4.6 mt 1.2 il 0.6	Pigeon Point, Minnesota.	W. F. Hillebrand.	W. S. Bayley, A. J. S., XXXVII, p. 59, 1889.	Quartz-keratophyre.	Dried at 105°. 3 specimens.
NiO	trace	Q 26.5 or 25.6 ab 33.5 an 5.8 C 1.8	hy 2.3 mt 1.2 il 0.5 hm 1.1	6 m. E. of Ironton, Missouri.	W. H. Melville.	E. Haworth, A. R. Mo. G. S., VIII, p. 181, 1890.	Granite.	Sum low.
SrO Li_2O	trace trace	Q 33.1 or 36.1 ab 22.0 an 5.8	hy 1.2 mt 1.1 il 0.6	Big Timber Creek, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S. 148, p. 142, 1897.	Granitite.	
SrO Li_2O	0.08 trace	Q 13.5 or 24.5 ab 35.6 an 15.8	di 2.4 hy 4.9 mt 1.2 il 0.9	Sweet Grass Creek, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S. 148, p. 142, 1897.	Porphyrite.	
SrO Li_2O	trace trace	Q 31.9 or 28.9 ab 28.8 an 5.6 C 1.3	hy 0.6 mt 0.8	Yogo Peak, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 523, 1900.	Rhyolite-porphyry.	
SO_3 Cl SrO	trace trace 0.06	Q 27.4 or 26.1 ab 28.8 an 10.6 C 0.7	hy 1.6 mt 0.2 il 0.6 hm 0.6	Wolf Butte, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 499, 1900.	Granite-porphyry.	
SO_3 Cl SrO	trace trace 0.09	Q 20.0 or 29.5 ab 37.2 an 6.7 C 1.0	hy 1.8 mt 0.2 il 0.6 hm 2.1	Mount Barker, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 505, 1900.	Granite-porphyry.	
SO_3 Cl SrO	trace trace 0.09	Q 18.1 or 28.9 ab 34.6 an 10.0	di 1.5 hy 2.9 mt 1.8 il 0.6 hm 0.3	Thunder Mountain, Little Belt Mountains, Montana.	H. N. Stokes.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 509, 1900.	Granite-porphyry.	
SrO	0.03	Q 16.4 or 30.6 ab 34.6 an 8.1	di 2.3 hy 4.1 mt 2.6 il 0.5	Big Baldy Mountain, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 511, 1900.	Quartz-syenite-porphyry.	
SrO Li_2O	0.07 trace	Q 16.1 or 28.9 ab 33.5 an 8.9	di 2.4 hy 5.4 mt 2.1 il 0.5	Sheep Creek, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 497, 1900.	Granite-syenite-aplite.	
ZrO_2 SO_3 Cl SrO	0.37 trace 0.05 0.08	Q 12.6 or 30.0 ab 37.2 an 9.7	di 3.0 hy 2.8 mt 3.5 il 0.9	Wright and Edwards Mine, Barker, Little Belt Mts., Mont.	W. F. Hillebrand.	L. V. Pirrson, 20 A. R. U. S. G. S., III, p. 466, 1900.	Syenite.	
ZrO_2 FeS_2 SrO Li_2O Cu	0.02 0.39 0.02 trace 0.03	Q 25.5 or 37.8 ab 22.5 an 7.2 C 1.1	hy 2.7 mt 0.5 il 0.5	Modoc Mine, Butte District, Montana.	W. F. Hillebrand.	W. H. Weed, B. U. S. G. S. 168, p. 119, 1900.	Quartz-porphyry.	Near dellenose.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
30	67.12	15.00	1.62	2.23	1.74	3.43	2.76	4.52	0.58	0.09	none	0.48	0.15	0.06	0.07	99.88	
A1. I	1.119	.147	.010	.031	.044	.061	.044	.048				.006	.001	.001	—		
31	68.42	15.01	0.97	1.93	1.21	2.60	3.23	4.25	0.73	0.54	0.20	0.50	0.13	0.06	0.12	99.95	
A1. I	1.140	.147	.006	.027	.030	.047	.051	.046				.006	.001	.001	.001		
32	73.84	12.47	0.32	0.90	0.25	1.08	2.88	5.38	2.76					trace		99.88	
A3. III	1.231	.122	.002	.012	.006	.020	.047	.058						—			
33	71.85	13.17	2.17	1.34	0.63	2.25	4.06	3.89	0.43			0.43	0.14	0.12		100.48	
A2. II	1.198	.129	.014	.018	.016	.040	.065	.041				.005	.001	.002			
34	71.62	14.99	1.27	1.01	0.74	1.33	3.62	4.81	0.41			0.08	trace	0.17		100.05	
A2. II	1.194	.147	.008	.014	.019	.023	.058	.051				.001	—	.002			
35	69.45	14.92	3.16	0.23	0.05	1.19	3.19	5.95	1.69			0.19	0.06	0.07	0.03	100.18	
A1. I	1.158	.146	.020	.003	.001	.021	.051	.064				.002	—	.001	—		
36	64.40	15.77	2.47	1.15	2.12	3.54	4.10	3.81	1.93	0.31		0.40	0.16	0.04		100.37	
A1. I	1.073	.154	.015	.016	.053	.063	.066	.041				.005	.001	—			
37	73.50	14.87	0.95	0.42	0.29	2.14	3.46	3.56	0.90			none	none	0.03	none	100.12	
A1. I	1.225	.146	.006	.006	.007	.038	.056	.038				—	—	—	—		
38	67.29	15.78	1.86	1.97	0.72	2.36	3.77	3.55	2.10		0.27	none	0.28	0.21	none	100.16	
A1. I	1.122	.154	.012	.028	.018	.042	.061	.038				—	.002	.003	—		
39	68.60	16.21	1.67	1.57	1.05	2.61	3.29	3.88	0.92		0.19	none	0.21	0.09		100.32	2.640
A1. I	1.143	.159	.010	.022	.026	.047	.053	.041				—	.001	.001			27°
40	65.94	16.00	0.60	1.74	1.02	2.87	3.85	4.56	1.13		1.55	none	0.23	none		100.26	2.672
A2. II	1.099	.157	.004	.024	.026	.051	.062	.049				—	.002	—			21°
41	65.51	17.01	none	2.79	0.90	3.16	3.82	4.67	1.78				0.13			100.15	2.666
A2. II	1.092	.167	—	.039	.023	.056	.061	.050					.001				26°
42	70.87	15.18	2.18	0.12	0.60	1.58	3.47	5.04	1.08			trace	trace	trace		100.12	
A2. II	1.181	.149	.014	.002	.015	.029	.056	.054				—	—	—			
43	63.88	19.96	2.21	0.57	0.58	2.03	4.19	3.88	2.63					trace		99.93	
A3. III	1.065	.195	.014	.008	.015	.036	.068	.041						—			
44	71.56	14.91	1.47	1.04	0.08	1.98	3.78	4.94	0.44				trace			100.20	2.59
A3. III	1.193	.146	.009	.014	.002	.036	.061	.053					—				18°
45	68.85	17.01	1.78	0.65	trace	1.62	3.44	5.11	1.79					trace		100.25	2.489
A3. III	1.148	.167	.011	.009	—	.029	.055	.055						—			14°
46	68.61	16.43	0.73	1.52	0.05	1.79	2.82	4.65	3.35							99.95	2.423
A3. III	1.144	.161	.005	.021	.001	.032	.045	.050									14°

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 Cr_2O_3 SrO Li_2O	trace none 0.03 trace	Q 23.5 or 26.7 ab 23.1 an 15.3	di 1.4 hy 5.0 mt 2.3 il 0.9	Near Boulder, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899.	Granite.	
S NiO SrO	0.02 none 0.03	Q 25.1 or 25.6 ab 26.7 an 13.1 C 0.3	hy 5.0 mt 1.4 il 0.9	Idaho-Hailey Mine, Hailey, Idaho.	W. F. Hillebrand.	W. Lindgren, 20 A. R. U. S. G. S., III, p. 81, 1900.	Quartz-monzonite.	
		Q 32.9 or 32.2 ab 24.6 an 4.7	di 0.8 hy 1.5 mt 0.5	Midway Geyser Basin, Yellowstone National Park.	H. N. Stokes.	J. P. Iddings, B. U. S. G. S. 150, p. 153, 1898.	Rhyolite-perlite.	
		Q 28.9 or 22.8 ab 34.1 an 6.4	di 3.5 mt 3.2 il 0.6	Tower Creek, Yellowstone National Park.	F. A. Gooch.	J. P. Iddings, M. U. S. G. S., XXXII, p. 426, 1899.	Rhyolite.	
Cl	trace	Q 28.1 or 28.4 ab 30.4 an 6.4 C 1.5	hy 2.8 mt 1.9	Hurricane Ridge, Crandall Basin, Yellowstone Natl. Pk.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 261, 1899.	Aplite.	
		Q 25.6 or 35.6 ab 26.7 an 5.8 C 1.0	il 0.3 hm 3.2	Sunset Peak, Bear Gulch, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 325, 1899.	Rhyolite.	
NiO	0.17	Q 16.1 or 22.8 ab 34.6 an 13.1	di 3.4 hy 3.7 mt 2.6 il 0.8 hm 0.6	Hurricane Ridge, Crandall Basin, Yellowstone Natl. Pk.	W. H. Melville.	J. P. Iddings, M. U. S. G. S., XXXII, p. 261, 1899.	Quartz-mica-diorite-porphyry.	
SrO	trace	Q 34.7 or 21.1 ab 29.3 an 10.6 C 1.4	hy 0.7 mt 1.4	Prospect Mt., Mosquito Range, Leadville District, Colorado.	L. G. Eakins.	W. Cross, M. U. S. G. S., XII, p. 326, 1886.	Quartz-porphyry.	
SrO Li_2O	none trace	Q 24.6 or 21.1 ab 32.0 an 11.7 C 1.3	hy 3.9 mt 2.8	Sugar Loaf, Ten Mile District, Colorado.	L. G. Eakins.	W. Cross, 14 A. R. U. S. G. S., p. 227, 1894.	Quartz-porphyrite.	
Cl SrO	0.03 trace	Q 26.8 or 22.8 ab 27.8 an 13.1 C 1.8	hy 4.3 mt 2.3	McNulty Gulch, Leadville, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S. 148, p. 176, 1897.	Granite-porphyry.	
FeS_2	0.60	Q 17.4 or 27.2 ab 32.5 an 12.8	di 1.1 hy 4.7 mt 0.9 pr 0.6	Jefferson Tunnel, Leadville, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S. 148, p. 176, 1897.	Granite-porphyry.	
Cl S	trace 0.38	Q 15.2 or 27.8 ab 32.0 an 15.6	hy 7.4	Jefferson Tunnel, Leadville, Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S. 148, p. 176, 1897.	Granite-porphyry.	Same as No 40.
		Q 26.9 or 30.0 ab 29.3 an 8.1 C 1.0	hy 1.5 mt 0.5 hm 1.9	Pennsylvania Hill, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 324, 1896.	Rhyolite.	
		Q 19.4 or 22.8 ab 35.6 an 10.0 C 5.1	hy 1.5 mt 2.8	Robinson Plateau, Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 321, 1896.	Andesite.	"Decomposed."
		Q 26.0 or 29.5 ab 32.0 an 8.9	di 1.0 hy 0.4 mt 2.1	Round Mountain, Elk Mountains, Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S. 148, p. 177, 1897.	Rhyolite.	
		Q 25.8 or 30.6 ab 28.8 an 8.1 C 2.9	mt 2.5	Summit District, Rio Grande County, Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S. 148, p. 179, 1897.	Rhyolite.	
		Q 29.6 or 27.8 ab 23.6 an 8.9 C 3.5	hy 2.2 mt 1.2	Del Norte, Rio Grande County, Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S. 148, p. 179, 1897.	Rhyolite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
47	65.70	15.31	2.54	1.62	1.62	2.56	3.62	4.62	0.42	0.17	none	0.72	0.33	trace	0.12	99.53	2.720
A1. I	1.095	.150	.015	.022	.041	.047	.058	.049				.009	.002	—	.001		34°
48	69.52	15.44	1.90	0.09	0.17	1.70	4.54	5.04	0.27	0.33	0.17	0.23	0.14	0.08	0.19	99.90	
A1. I	1.169	.151	.012	.001	.004	.030	.073	.054				.003	.001	.001	.001		
49	66.12	17.21	2.43	trace	0.35	2.11	4.70	5.57	0.71	0.14		0.29	0.11	0.08	0.25	100.18	
A1. I	1.102	.168	.015	—	.009	.038	.076	.060				.004	.001	.001	.002		
50	74.49	14.51	0.57	0.32	trace	1.03	3.79	4.64	0.64					trace		99.99	
A3. III	1.242	.142	.004	.004	—	.018	.061	.050						—			
51	71.56	14.28	0.89	none	0.42	1.18	3.00	4.37	0.79	0.36	none	0.38	none	trace	0.28	100.01	
A1. I	1.193	.140	.006	—	.011	.021	.048	.047				.005	—	—	.002		
52	69.18	14.37	2.52	0.57	0.70	1.88	3.58	5.00	0.25	0.35		0.69	0.26	0.10	0.09	99.55	
A1. I	1.153	.141	.015	.008	.018	.034	.058	.054				.008	.002	.001	.001		
53	75.01	13.88	0.74	n. d.	0.09	1.00	3.52	4.89	0.26	0.11	none	0.06	trace	trace	0.10	99.66	
A2. II	1.250	.136	.005	(.010)	.002	.018	.056	.053				.001	—	—	.001		
54	73.51	14.42	0.46	1.49	0.33	1.26	4.03	4.29	0.40				0.04	trace		100.23	
A3. III	1.225	.141	.003	.021	.008	.022	.064	.046					—	—			
55	73.64	13.44	0.60	0.74	0.26	1.26	3.51	4 50	1.99	—		0.11	0.06	0.06	0.11	100.30	
A1. I	1.227	.132	.004	.010	.007	.022	.056	.048				.001	—	.001	.001		
56	73.25	13.25	none	1.74	0.28	2.23	2.69	3.79	1.03	0.07	1.05	trace	trace	trace	trace	99.96	
A1. I	1.221	.130	—	.024	.007	.039	.043	.061				—	—	—	—		
57	72.40	14.81	0.81	0.88	0.47	1.94	3.91	3.90	0.59	—		0.18	0.03	0.07	0.10	100.13	
A1. I	1.207	.145	.005	.012	.012	.035	.063	.041				.002	—	.001	.001		
58	71.39	14.13	0.63	0.37	0.08	1.01	2.89	5.69	3.32	0.42		0.17	0.03	trace	0.09	100.22	
A1. I	1.190	.138	.004	.005	.002	.018	.047	.061				.002	—	—	.001		
59	76.03	13.39	0.48	0.31	0.05	1.28	2.98	5.18	0.34	0.15		0.07	0.03	trace	0.04	100.33	
A1. I	1.267	.121	.003	.005	.001	.023	.048	.055				.001	—	—	—		
60	75.97	13.07	0.61	0.39	0.14	1.49	2.51	5.62	0.24	0.14	none	0.09	trace	trace	0.14	100.44	
A1. I	1.266	.128	.004	.005	.004	.027	.040	.060				.001	—	—	.001		
61	71.08	15.90	0.62	1.31	0.54	2.60	3.54	4.08	0.30	none	trace	0.22	0.10	0.15	0.04	100.60	
A1. I	1.185	.156	.004	.018	.014	.047	.057	.043				.003	.001	.002	—		
62	65.81	15.11	1.85	1.40	0.37	1.98	2.59	5.24	n. d.			0.54	0.23		0.10	95.22	2.38
A2. II	1.097	.148	.012	.019	.009	.036	.042	.056				.007	.002				
63	62.33	17.30	3.00	1.63	1.05	3.23	4.21	4.46	0.75	0.44		1.05	0.29	0.08	0.24	100.33	
A1. I	1.039	.170	.019	.022	.026	.057	.068	.048				.013	.002	.001	.002		

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

Inclusive.		Nórm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 Cl SrO Li_2O	0.12 0.03 0.03 trace	Q 19.1 or 27.2 ab 30.4 an 12.1 C 0.4	hy 4.1 mt 3.5 il 1.4	Near San Miguel Peak, Telluride, Colorado.	H. N. Stokes.	W. Cross, Telluride folio, U. S. G. S., p. 6, 1899.	Quartz-monzonite.	
ZrO_2 SrO	0.05 0.04	Q 21.1 or 30.0 ab 38.3 an 6.7	di 0.9 il 0.2 hm 1.9 tn 0.4	Robbin's Ranch, Pikes Peak, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S. 148, p. 163, 1897.	Trachyte?	
ZrO_2 SrO	0.06 0.05	Q 12.4 or 33.4 ab 39.8 an 8.9	di 0.4 hy 0.9 hm 2.4 tn 0.7	Wicher Mountain, Pikes Peak, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S. 148, p. 163, 1897.	Trachyte?	
Li_2O	trace	Q 32.4 or 27.8 ab 32.0 an 5.0 C 1.3	mt 0.9	Thomas Range, Utah.	L. G. Eakins.	W. Cross, Pr. Colo. Sc. Soc., II, p. 69, 1887.	Rhyolite.	
FeS_2 Cr_2O_3 V_2O_3 SrO Li_2O As	2.29 trace 0.02 trace none trace	Q 34.2 or 26.1 ab 25.2 an 5.8 C 2.5	hy 1.1 hm 0.9 pr 2.3	Swansea Mine, Tintic District, Utah.	H. N. Stokes.	Tower and Smith, 19 A. R. U. S. G. S., III, p. 637, 1899.	Quartz-porphyry.	
Cl Cr_2O_3 V_2O_3 MoO SrO	trace trace 0.01 trace trace	Q 24.0 or 30.0 ab 30.4 an 8.1	di 1.1 hy 1.3 il 1.2 hm 2.5	S. of Pinyon Creek, Tintic District, Utah.	H. N. Stokes.	Tower and Smith, 19 A. R. U. S. G. S., III, p. 634, 1899.	Rhyolite.	
SrO Li_2O	trace trace	Q 32.9 or 29.5 ab 29.3 an 5.0 C 0.9	hy 1.5	Skwentna River, Alaska.	H. N. Stokes.	J. E. Spurr, A. G., XXV, p. 231, 1900.	Alaskite.	
		Q 29.7 or 25.6 ab 33.5 an 6.1 C 0.9	hy 3.2 mt 0.7	Medicine Lake, Modoc County, California.	L. G. Eakins.	J. S. Diller, B. U. S. G. S., 148, p. 228, 1897.	Rhyolite-obsidian.	
SrO Li_2O	0.02 trace	Q 32.8 or 26.7 ab 29.3 an 6.1 C 0.6	hy 1.6 mt 0.9	Slate Creek, Tehama County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 192, 1897.	Rhyolite.	Dried at 110°.
FeS_2 SrO Li_2O	0.58 trace? trace	Q 30.1 or 33.9 ab 22.5 an 7.2	di 3.2 hy 2.3	Tower Rock, Grizzly Mountains, Plumas County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 484, 1894.	Quartz-porphyry.	
SrO Li_2O	0.04 trace	Q 29.6 or 22.8 ab 33.0 an 9.7 C 0.7	hy 2.1 mt 1.2	Mount Stover, Plumas County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 192, 1897.	Rhyolite.	Dried at 110°.
SrO Li_2O	trace trace	Q 30.2 or 33.9 ab 21.6 an 5.0 C 1.2	hy 0.4 mt 0.9	Near Grizzly Peak, Plumas County, California.	W. F. Hillebrand.	H. W. Turner, J. G., III, p. 407, 1895.	Rhyolite.	
SrO Li_2O	trace trace	Q 36.3 or 30.6 ab 25.2 an 5.0	di 1.0 mt 0.7	Yuba Gap, Sierra County, California.	W. F. Hillebrand.	H. W. Turner, J. G., III, p. 403, 1895.	Aplite.	Near tehamose.
Cr_2O_3 NiO SrO Li_2O	none none 0.03 trace	Q 36.4 or 33.4 ab 21.0 an 7.5	hy 0.6 mt 0.9	East of Milton, Sierra County, California.	W. F. Hillebrand.	H. W. Turner, J. G., VII, p. 160, 1899.	Aplite.	Near tehamose.
ZrO_2 SO_3 Cl SrO Li_2O	0.08 none 0.02 0.02 trace	Q 27.8 or 23.9 ab 29.9 an 13.1 C 0.9	hy 3.3 mt 0.9	El Capitan, Yosemite Valley, California.	W. Valentine.	H. W. Turner, J. G., VII, p. 143, 1899.	Biotite-granite.	
		Q 25.7 or 31.1 ab 22.0 an 10.0 C 1.4	hy 0.9 mt 2.8 il 1.1	Griswold Creek, California.	G. Steiger.	F. L. Ransome, A. J. S., V, p. 363, 1898.	Biotite-augite-latite.	H_2O not determined.
ZrO_2 FeS_2 V_2O_3 SrO Li_2O Org.	0.04 0.06 0.01 0.05 trace 0.11	Q 12.4 or 26.7 ab 35.6 an 15.0	di 0.8 hy 2.3 mt 2.1 il 2.0 hm 1.6	Clover Meadow, Tuolumne County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., II, p. 727, 1896.	Trachyte.	"Latite," cf. F. L. Ransome, B. U. S. G. S. 89, p. 58, 1898.

CLASS. I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
64	70.43	15.51	0.96	1.28	0.37	2.76	2.75	5.14	0.40	0.08	none	0.24	0.11	trace	2.20	100.28	
A1. I	1.174	.152	.006	.018	.009	.049	.044	.055				.003	.001	—	.001		
65	72.48	14.06	0.89	1.05	0.62	2.17	3.30	4.75	0.35	0.16		0.28	0.09	trace	0.08	100.28	
A1. I	1.208	.138	.006	.015	.016	.039	.053	.051				.004	.001	—	.001		
66	66.83	15.24	2.73	1.66	1.63	3.59	3.10	4.46	0.56	none	trace	0.54	0.18	0.10	0.11	100.82	
A1. I	1.114	.149	.017	.023	.041	.064	.050	.048				.007	.001	.001	.001		
67	67.39	15.99	0.56	1.99	0.77	1.63	4.74	4.80	2.06							99.93	
A3. III	1.123	.156	.003	.028	.019	.029	.076	.051									
68	70.39	14.09	0.53	2.12	0.62	3.08	3.70	3.51	2.50							100.54	2.41
A3. III	1.173	.138	.003	.030	.016	.055	.059	.037									
69	69.96	15.78	2.50	n. d.	0.64	1.73	3.80	4.12	1.53							100.07	
A4. IV	1.166	.155	.016	(.032)	.016	.030	.061	.043									
70	75.08	13.63	1.35	0.28	0.17	1.22	3.79	4.22	0.23			0.03	0.06	trace		100.06	2.354
A2. II	1.251	.134	.009	.004	.004	.021	.061	.045				—	—	—			
71	68.40	16.89	2.95	n. d.	trace	1.50	4.25	3.98	1.94							99.91	
A4. IV	1.140	.165	.019	(.038)	—	.027	.069	.042									
72	70.48	14.24	3.72	n. d.	0.40	1.48	3.66	4.26	1.59							99.83	
A4. IV	1.175	.140	.023	(.046)	.010	.027	.059	.046									
73	67.79	16.30	4.43	n. d.	1.45	2.32	3.49	3.48	0.95				0.27			100.98	
A4. IV	1.130	.160	.027	(.054)	.036	.041	.056	.037					.002				
74	75.74	13.71	0.55	n. d.	trace	1.26	3.72	4.69	0.46			0.17				100.30	
A3. III	1.262	.134	.003	(.006)	—	.022	.060	.050				.002					
75	70.54	14.77	3.70	n. d.	0.36	1.68	4.66	4.82	0.44							99.97	
A4. IV	1.176	.145	.023	(.046)	.009	.030	.075	.051									
76	62.35	19.50	3.05	2.25	1.46	2.40	2.71	3.28	0.75			1.25		0.18		99.18	
B2. III	1.039	.191	.019	.031	.037	.043	.044	.035				.015		.002			
77	70.05	14.78	n. d.	3.37	0.44	3.42	3.10	4.13	0.42			0.19		0.22		100.12	
A3. III	1.168	.145	—	.048	.011	.060	.050	.043				.002		.003			
78	72.76	14.89	0.95	n. d.	0.46	1.26	4.25	4.50	0.54			trace		0.13		99.74	
A3. III	1.213	.146	.006	(.012)	.012	.023	.069	.048				—		.001			
79	71.21	13.95	0.65	2.22	0.94	2.28	2.87	4.86	0.89					0.42		100.29	
A3. III	1.187	.137	.004	.030	.024	.039	.047	.052						.006			
80	69.79	14.23	0.10	2.58	0.61	1.73	3.27	4.45	3.19					0.24		100.19	
A3. III	1.163	.140	.001	.036	.015	.030	.053	.047						.003			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
FeS_2 trace SrO 0.05 Li_2O trace	Q 27.8 or 30.6 ab 23.1 an 23.6 C 0.4	hy 2.2 mt 1.4 il 0.5	North Fork of Tuolumne River, Amador County, Cal.	W. F. Hillebrand.	H. W. Turner, J. G., VII, p. 143, 1889.	Biotite-granite.	
SrO trace	Q 29.4 or 28.4 ab 27.8 an 9.5	di 1.1 hy 1.7 mt 1.4 il 0.6	Lake Tenaya, Mariposa County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 482, 1894.	Granite-porphyry.	
ZrO_2 0.04 SO_3 none Cl 0.02 SrO 0.03 Li_2O trace	Q 22.2 or 26.7 ab 26.2 an 14.2	di 2.6 hy 3.4 mt 3.9 il 1.1	Nevada Falls Trail, Yosemite Valley, California.	W. Valentine.	H. W. Turner, J. G., VII, p. 152, 1899.	Quartz-monzonite.	"Granite" in B. U. S. G. S. 168, p. 208, 1900.
	Q 15.5 or 28.4 ab 39.8 an 8.1	hy 5.2 mt 0.7	Mono Lake, California.	W. H. Melville.	W. Lindgren, B. U. S. G. S., 150, p. 149, 1898.	Rhyolite-pumice.	
H_2O includes S	Q 27.4 or 20.6 ab 30.9 an 11.7	di 3.2 hy 3.6 mt 0.7	Northwest Harbor, San Clemente Island, California.	W. S. T. Smith.	W. S. T. Smith, 18 A. R. U. S. G. S., II, p 488, 1898.	Rhyolite.	
	Q 26.0 or 23.9 ab 32.0 an 8.3 C 2.1	hy 5.8	McClellan Peak, Washoe, Nevada.	F. A. Gooch.	Hague and Iddings, B. U. S. G. S., 17, p. 33, 1885.	Dacite.	
	Q 34.1 or 25.0 ab 32.0 an 5.8 C 0.7	hy 0.4 mt 0.9 hm 0.8	Lagune di Maricunga, Chile.	F. Wolff.	F. Wolff, Z. D. G. G., LI, p. 546, 1899.	Liparite.	
	Q 22.9 or 23.4 ab 36.2 an 7.5 C 2.8	hy 5.0	Maskórdshnur, Iceland.	C. W. Schmidt.	C. W. Schmidt, Z. D. G. G., XXXVII, p. 744, 1885.	Liparite.	
	Q 26.1 or 25.6 ab 30.9 an 7.5 C 0.8	hy 7.1	Slieve-na-Gloch, Carlingford, Ireland.	S. Haughton.	W. J. Sollas, T. R. Ir. Ac., XXX, Pt. XI, p. 491, 1894.	Granite.	
	Q 24.0 or 20.6 ab 29.3 an 11.4 C 2.7	hy 10.8	Ferrières, Esterel, France.	Rüst.	A. Michel-Levy, B. S. C. G. Fr., No. 97, p. 27, 1897.	Quartz-porphyry.	
	Q 33.2 or 27.8 ab 31.4 an 6.1 C 0.2	hy 0.5 il 0.3	Lier, Norway.	R. Mauzelius.	W. C. Brögger, Z. K., XVI, p. 77, 1890.	Granite.	
	Q 19.0 or 28.4 ab 39.3 an 5.3	di 2.7 hy 5.5	Löken, n. Holmestrand, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 57, 1890.	Aegirite-granite.	
	Q 26.5 or 19.5 ab 23.1 an 12.0 C 7.0	hy 3.7 mt 3.7 il 2.3 hm 0.5	Thinghoud, Norway.	G. Särnström.	W. C. Brögger, Z. K., XVI, p. 46, 1890.	Akerite.	Sum low.
	Q 26.3 or 23.9 ab 26.2 an 14.5	di 2.0 hy 6.5	Kortfors, Örebro, Sweden.	H. Santesson.	H. Bäckström, G. F. F., XVI, p. 108, 1894.	Granite.	
	Q 26.5 or 26.7 ab 36.2 an 6.4 C 0.6	hy 2.8	Hamphorfva, Smaland, Sweden.	H. Santesson.	O. Nordenskjöld, Abh. Sv. G. Und., No. 135, p. 35, 1894.	Microgranite.	
	Q 27.9 or 28.9 ab 24.6 an 10.8	hy 5.9 mt 0.9	Lake Mien, Sweden.	H. Santesson.	N. O. Holst, Abh. Sver. G. Und. No. 110, p. 37, 1890.	Rhyolite.	
	Q 27.2 or 26.1 ab 27.8 an 8.3 C 1.0	hy 6.1 mt 0.2	Lake Mien, Sweden.	H. Santesson.	N. O. Holst, Abh. Sver. G. Und. No. 110, p. 37, 1890.	Rhyolite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
81	68.55	14.73	0.37	2.56	1.39	2.83	2.88	4.10	2.34					0.73		100.48	
A3. III	1.143	.144	.002	.036	.035	.050	.047	.043						.010			
82	67.00	15.79	0.02	3.10	0.97	1.77	2.14	4.74	4.43							99.96	
A3. III	1.117	.155	—	.043	.024	.032	.034	.050									
83	69.92	14.78	1.54	1.75	1.05	1.88	2.92	4.16	1.51					0.43		99.94	
A3. III	1.165	.145	.009	.025	.026	.034	.047	.044						.006			
84	69.48	13.88	2.67	1.53	0.71	2.39	3.74	4.44	1.19					0.15		100.18	
A3. III	1.158	.136	.017	.021	.018	.043	.059	.047						.002			
85	73.38	14.36	0.86	0.79	0.46	1.33	2.85	4.98	0.37			0.20		0.22		99.80	
A2. II	1.223	.141	.005	.011	.012	.023	.046	.054				.003		.003			
86	71.63	16.10	1.01	n. d.	0.26	1.72	3.96	4.49	0.60							99.77	2.59
A3. III	1.194	.158	.006	(.012)	.007	.030	.064	.048									
87	66.88	17.89	3.75	n. d.	1.53	1.44	3.55	3.77	1.93		0.08					100.82	2.68
A4. IV	1.115	.175	.024	(.048)	.038	.025	.057	.040									
88	65.91	15.58	2.07	2.19	1.41	2.40	4.01	3.94	1.15		0.11	0.58	0.20			99.84	2.613
A2. II	1.099	.153	.013	.030	.035	.043	.064	.042				.007	.001				
89	64.55	13.62	1.23	1.24	0.67	5.07	3.48	4.13	1.90		3.70	0.29	0.10			100.03	2.593
A2. II	1.076	.133	.007	.017	.017	.091	.056	.043				.004	.001				
90	62.20	14.69	3.83	0.43	1.86	2.91	2.82	5.03	2.47		3.35	0.52	0.20			100.43	2.631
A2. II	1.037	.144	.024	.006	.047	.051	.045	.054				.006	.001				
91	66.75	15.87	1.82	2.31	0.91	1.99	3.13	4.40	2.74							99.92	
A3. III	1.113	.155	.011	.032	.022	.036	.050	.047									
92	71.53	13.55	1.20	0.88	1.45	3.21	2.61	3.95	1.75							100.13	
A3. III	1.192	.133	.007	.012	.036	.057	.042	.042									
93	69.94	13.45	0.49	4.64	0.67	2.26	2.42	4.25	0.77			0.45	0.23			99.71	2.712
A2. II	1.166	.132	.003	.064	.017	.040	.039	.046				.006	.002				
94	71.93	15.54	0.59	2.10	0.46	1.60	2.61	5.30	0.69			trace	0.27			101.09	2.664
B2. III	1.199	.152	.004	.030	.012	.027	.042	.057				—	.002				
95	69.66	16.98	2.54	n. d.	0.83	1.66	3.95	4.41	0.55						0.02	100.70	
A4. IV	1.161	.167	.016	(.032)	.021	.030	.064	.047							—		
96	68.58	15.67	2.95	n. d.	1.17	2.10	2.36	5.01	1.30				0.40			99.54	
A4. IV	1.143	.153	.019	(.038)	.029	.038	.038	.054					.003				
97	65.82	15.94	5.06	n. d.	trace	1.65	3.54	6.17	1.85					trace		100.03	2.68
A4. IV	1.097	.156	.032	(.064)	—	.030	.057	.066						—			

ORDE 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 26.0 hy 8.0 or 23.9 mt 0.5 ab 24.6 an 13.9 C 0.4	Lake Mien, Sweden.	H. Santesson.	N. O. Holst, Abh. Sver. G. Und. No. 110, p. 37, 1890.	Rhyolite.	
	Q 28.9 hy 8.1 or 27.8 ab 17.8 an 8.9 C 4.0	Lake Mien, Sweden.	H. Santesson.	N. O. Holst, Abh. Sver. G. Und. No. 110, p. 37, 1890.	Rhyolite.	
	Q 30.5 hy 4.6 or 24.5 mt 2.1 ab 24.6 an 9.5 C 2.0	Brusen, Helsingland, Sweden.	H. Santesson.	F. Svenonius, G. F. F., X, p. 273, 1888.	Andesite breccia.	"Dellenite" of Brögger.
	Q 25.6 di 3.0 or 26.1 hy 0.9 ab 30.9 mt 3.9 an 8.3	Dellen, Helsingland, Sweden.	H. Santesson.	F. Svenonius, G. F. F., X, p. 273, 1888.	Hypersthene-andesite.	"Dellenite" of Brögger, Eg. Kg. II, p. 59, 1895.
	Q 33.1 hy 1.6 or 30.0 mt 1.2 ab 24.1 il 0.5 an 6.4 C 1.8	Lake Raslangen, Scania, Sweden.	H. Santesson.	H. Bäckström, Sv. Vet. Ak. Hd., XXIX, p. 8, 1897.	Granite.	
	Q 26.6 hy 2.3 or 26.7 ab 33.5 an 8.3 C 1.6	Lestiware, Umptek, Finland.	H. Berghell.	W. Ramsay, Fennia, XI, p. 72, 1894.	Granite.	
	Q 23.8 hy 10.1 or 22.2 ab 29.9 an 7.0 C 5.4	Lamersdorf, Aachen, Rh. Prussia.	F. H. Hatch.	A. von Lasaulx, cf N. J., 1886, I, p. 53.	Granite.	
SO_3 0.14 Org. 0.15	Q 19.9 hy 4.8 or 23.4 mt 4.1 ab 33.5 an 11.9 C 0.4	Lemberg, Nahe Thal, Rh. Prussia.	Jacobs.	K. A. Lossen, Z. D. G. G., XL, p. 203, 1888.	Quartz-porphyrite.	SO_3 for S.
SO_3 0.05	Q 20.0 di 5.2 or 23.9 hy 3.9 ab 29.3 mt 1.6 an 9.5 il 0.6	Münster am Stein, Nahe Thal, Rh. Prussia.	K. Böttcher.	K. A. Lossen, Z. D. G. G., XLIII, p. 537, 1891.	Granite-porphyry.	SO_3 for S. Not fresh.
SO_3 0.12	Q 18.0 di 1.2 or 30.0 hy 4.1 ab 23.6 il 0.9 an 12.5 hm 3.8	Near Kreuznach, Rh. Prussia.	K. Böttcher.	K. A. Lossen, Z. D. G. G, XLIII, p. 537, 1891.	Quartz-porphyry.	SO_3 for S. Decomposed.
	Q 25.0 hy 5.0 or 26.1 mt 2.6 ab 26.2 an 10.0 C 2.2	Brandenberg, Munsterthal, Schwarzwald, Baden.	Bunsen's Laboratory.	A. Schmidt, cf N. J., 1889, I, p. 95.	Porphyry.	
	Q 32.5 di 1.8 or 23.4 hy 3.4 ab 22.0 mt 1.6 an 13.6	Pfaffenberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 162, 1899.	Granitite.	
SO_3 0.14	Q 30.2 hy 9.1 or 25.6 mt 0.7 ab 20.4 il 0.9 an 11.1 C 0.7	Elbingerode, Harz Mountains.	Fischer.	K. A. Lossen, Z. D. G. G., XL, p. 203, 1888.	Hypersthene-quartz-porphyrite.	SO_3 for S.
Li_2O trace Cu trace	Q 30.8 hy 4.7 or 31.7 mt 0.9 ab 22.0 an 7.5 C 2.7	Zwisenburg, Fichtelgebirge,? Bavaria.	A. Böttger.	F. v. Sandberger, Sb. Münch. Ak., XVIII, p. 466, 1888.	Lithionite-granite.	Sum high.
	Q 22.9 hy 6.3 or 26.1 ab 33.5 an 8.8 C 2.7	Carlsbad, Bohemia.	A. Schwager.	Schwager and Gümbel, Geogn. Jhft. Cassel, VII, p. 69, 1895.	Granite.	Given to three decimals.
	Q 26.9 hy 7.9 or 30.0 ab 19.9 an 10.6 C 2.3	Adalbertus Rock, Bohemia.	L. Jesser? not stated.	J. E. Hibsch, T. M. P. M., XV, p. 209, 1896.	Granitite.	
	Q 13.9 hy 8.4 or 36.7 ab 29.9 an 8.3 C 0.3	Miekinia, Cracow, Galicia.	R. Zuber.	R. Zuber, Sb. Wien, G. R.-A., XXXV, p. 750, 1885.	Quartz-porphyry.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
98	72.79	13.77	1.69	n. d.	0.28	1.24	3.39	4.38	2.41							99.95	2.416
A3. III	1.213	.135	.011	(.022)	.007	.022	.055	.047									
99	72.48	12.68	2.31	n. d.	0.73	2.39	3.30	4.35	1.31							99.55	2.458
A4. IV	1.208	.124	.014	(.028)	.018	.043	.053	.047									
100	67.99	17.54	1.17	0.82	0.13	1.44	4.92	5.78	0.05							99.84	
A3. III	1.133	.172	.007	.011	.003	.026	.079	.062									
101	70.44	15.63	1.34	1.12	0.55	1.98	4.03	5.18	0.55							100.82	
A3. III	1.174	.153	.008	.015	.014	.036	.064	.056									
102	68.89	14.05	2.18	1.43	0.83	2.15	4.56	4.30	0.41			0.23	0.03	trace	0.58	101.00	
B1. II	1.148	.138	.014	.019	.021	.039	.073	.046				.003	—	—	.004		
103	64.88	16.43	3.69	0.54	0.19	2.22	3.73	6.57	1.17		0.49					99.91	
A3. III	1.081	.161	.023	.007	.005	.039	.059	.070									
104	65.58	15.79	0.94	2.44	1.47	3.08	2.58	5.67	1.16	—		0.58	trace	trace		100.21	2.527
A1. I	1.093	.155	.006	.034	.037	.055	.042	.060				.007	—	—			15°
105	65.32	15.34	1.22	2.18	1.51	2.99	2.75	5.70	1.97	—		0.40		trace		101.03	2.552
B1. II	1.089	.150	.008	.030	.038	.053	.044	.061				.005		—			15°
106	65.31	16.36	0.68	1.68	1.06	2.85	2.78	5.97	1.01	—		0.47	trace	trace		100.31	2.546
A1. I	1.089	.160	.004	.023	.027	.051	.045	.064				.006	—	—			15°
107	64.76	16.48	0.74	2.74	1.74	3.24	2.67	5.49	1.62	—		0.42	trace	trace		100.32	2.562
A1. I	1.079	.162	.005	.038	.044	.058	.043	.058				.005	—	—			15°
108	63.15	16.29	1.76	2.40	1.87	3.61	2.46	5.96	2.28	—		0.30	trace	trace		100.77	2.615
A1. I	1.058	.160	.011	.033	.049	.064	.040	.063				.004	—	—			15°
109	65.71	16.46	0.96	3.04	1.09	3.05	3.03	5.04	1.83			trace				100.21	
A3. III	1.095	.161	.006	.042	.027	.054	.048	.054				—					
110	64.57	16.80	0.97	3.02	1.69	3.53	3.81	4.01	1.28	—						99.68	2.542
A3. III	1.074	.165	.006	.042	.042	.063	.061	.043									
111	74.53	13.60	2.18	n. d.	0.28	1.03	3.43	4.56	0.38							99.99	
A4. IV	1.242	.133	.014	(.028)	.007	.018	.055	.049									
112	72.60	15.48	1.52	n. d.	1.50	1.71	3.46	3.32	0.92							99.51	
A3. III	1.210	.152	.009	(.018)	.038	.030	.056	.035									
113	75.76	14.36	0.86	n. d.	0.12	1.20	4.02	3.82	0.37							100.51	
A3. III	1.263	.141	.005	(.010)	.003	.021	.064	.040									
[illegible]14	73.20	13.40	1.76	n. d.	0.10	1.46	3.17	4.70	2.77							100.56	
[illegible]	1.220	.131	.011	(.022)	.003	.027	.051	.050									

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC, TOSCANOSE—Continued.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 31.7 or 26.1 ab 29.2 an 6.1 C 1.1	hy 3.6	Hlinik, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 444, 1887.	Obsidian.	
	Q 29.7 or 26.1 ab 27.8 an 6.7	di 4.6 hy 3.2	Apate, Schemnitz, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 448, 1887.	Liparite.	
	Q 13.7 or 34.5 ab 41.4 an 7.2 C 0.5	hy 0.8 mt 1.6	Halasag, Ditro, Siebenburgen, Hungary.	J. v. Szadeczky.	J. v. Szadeczky, Sb. Sieb. Mus. Ver., XXI, 1900, cf. N. J., 1901, I, p. 402.	Quartz-nordmarkite.	
	Q 21.8 or 31.1 ab 33.5 an 9.2	di 0.8 hy 1.9 mt 1.9	Topla, S. Carinthia, Austria.	H. V. Graber.	H. V. Graber, Jb. Wien, G. R.-A., XLVII, p. 278, 1897.	Granite.	
ZrO_2 trace B_2O_3 0.38 SO_3 0.30 Cl 0.07 F 0.02 FeS_2 0.49 Cu 0.03 Pb 0.04	Q 21.0 or 25.6 ab 38.3 an 5.3	di 4.5 hy 0.6 mt 3.2	Platta Cotschna, Bundner Oberland, Switzerland.	J. R. Hanhart.	A. Bodmer-Beder, N. J. B. B., XI, p. 239, 1897.	Quartz-biotite-porphyry.	
	Q 13.9 or 38.9 ab 30.9 an 8.9	di 1.3 mt 1.6 hm 2.6	Käserngrat, Windgälle Mountains, Switzerland.	C. Schmidt.	C. Schmidt, N. J. B. B., IV, p. 432, 1886.	Porphyry.	
X 0.73 SO_3 0.19 Cl trace Li_2O trace	Q 18.6 or 33.4 ab 22.0 an 14.7	hy 7.4 mt 1.4 il 1.1	Vivo, Mte. Amiata, Tuscany.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 408, 1887.	Trachyte.	Dried at 100°.
X 0.57 SO_3 0.03 Cl 0.05 Li_2O trace	Q 18.4 or 33.9 ab 23.1 an 12.5	di 1.9 hy 5.1 mt 1.9 il 0.8	Above Casa Tasso, Mte. Amiata, Tuscany.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 411, 1887.	Trachyte.	Dried at 100°.
X 0.85 SO_3 none Cl trace FeS_2 1.29 Li_2O trace	Q 17.2 or 35.6 ab 23.6 an 14.2	hy 5.3 mt 0.9 il 0.9 pr 1.3	Fosso del Prato, Mte. Amiata, Tuscany.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 410, 1887.	Trachyte.	Dried at 100°.
X 0.33 SO_3 0.08 Cl 0.01 Li_2O trace	Q 17.1 or 32.2 ab 22.5 an 16.1 C 0.3	hy 8.1 mt 1.2 il 0.8	Poggio Traburzolo, Mte. Amiata, Tuscany.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 412, 1887.	Trachyte.	Dried at 100°.
X 0.47 SO_3 0.11 Cl 0.11 Li_2O trace	Q 14.8 or 35.0 ab 15.8 an 15.8	di 1.5 hy 6.5 mt 2.6 il 0.6	La Crocina, Mte. Amiata, Tuscany.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 413, 1887.	Trachyte.	Dried at 100°.
	Q 18.7 or 30.0 ab 25.2 an 15.0 C 0.5	hy 7.5 mt 1.4	Mte. Amiata, Tuscany.	L. Ricciardi.	L. Ricciardi, Gaz. Chem. Ital., XVIII, 1888.	Trachyte.	
	Q 14.8 or 23.9 ab 32.0 an 17.0	di 0.4 hy 8.8 mt 1.4	Mte. San Vito, Bracciano, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 362, 1897.	Toscanite.	Dried at 110°.
	Q 32.8 or 27.2 ab 28.8 an 5.0 C 1.1	hy 4.4	Cannetello, Lipari, Aeolian Islands.	F. Glaser.	A. Bergeat, Abh. Münch. Ak., XX, p. 118, 1899.	Obsidian.	
	Q 32.9 or 19.5 ab 29.3 an 8.3 C 3.2	hy 6.2	N. of Kamary, n. Balaklava, Crimea.	Lagorio.	A. Lagorio, Guide Exc. 7, Cong. Int, XXXIII, p. 27, 1897.	Biotite-granite.	
	Q 35.0 or 22.2 ab 33.5 an 5.8 C 1.6	hy 1.6	Sidi Zerzor, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Mrazec, M. Soc. Ph. Genev., XXXIII, p. 115, 1900.	Liparite.	
	Q 32.1 or 27.8 ab 26.7 an 7.5 C 0.3	hy 3.2	Cape Marsa, n. Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, M. Soc. Ph. Genev., XXXIII, p. 77, 1900.	Liparite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
115	72.74	12.70	1.91	n. d.	0.15	1.59	3.60	4.10	2.92							99.71	
A3. III	1.212	.124	.012	(.024)	.004	.029	.058	.043									
116	73.05	14.67	0.89	n. d.	0.26	0.97	3.99	5.11	0.91							99.85	2.211
A3. III	1.218	.144	.006	(.012)	.007	.018	.064	.055									21°
117	67.03	14.25	1.96	1.70	trace	1.05	3.85	3.90	5.73					trace		99.47	2.376
A3. III	1.117	.140	.013	.024	—	.019	.062	.041						—			
118	73.38	13.67	0.30	n. d.	0.09	1.18	2.99	6.47	n. d.			0.02	0.17	trace		99.33	
A2. II	1.223	.134	.002	(.004)	.002	.021	.048	.069				—	.001	—			
119	72.88	14.62	0.43	1.69	0.35	1.51	3.68	4.05	0.65				0.06	.009		100.01	
A3. III	1.215	.141	.003	.024	.009	.027	.059	.043					—	.001			
120	72.96	14 57	n. d.	1.62	0.52	1.47	4.59	4.26	0.37				0.07	trace		100.43	
A3. III	1.216	.143	—	.022	.013	.027	.074	.046					.001	—			
121	71.25	14.21	0.85	0.43	0.89	2.72	3.11	6.74	0.48							100.68	
A3. III	1.188	.139	.005	.005	.022	.048	.050	.071									
122	76.48	13.94	trace	none	0.01	1.08	3.70	4.90	0.86	0.15						101.12	2.611
B2. III	1.275	.136	—	—	—	.020	.060	.053									

RANG 2. DOMALKALIC. TOSCANASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	64.83	15.02	5.57	0.94	1.47	2.62	3.93	2.36	1.76		0.55	0.67		0.29		100.02	
A2. II	1.081	.147	.035	.013	.037	.047	.063	.025				.008		.004			
2	73.27	15.51	0.33	1.14	0.15	2.74	4.79	1.66	0.68			0.10	trace	trace		100.37	
A2. II	1.221	.152	.002	.016	.004	.049	.077	.018				.001	—	—			
3	70.64	15.34	1.83	1.10	0.52	1.24	5.23	3.55	0.38	0.14		0.90		trace		100.87	2.632
B2. III	1.177	.150	.011	.014	.013	.022	.084	.038				.011		—			12.5°
4	69.70	18.72	0.65	0.79	0.45	2.25	5.01	1.68	0.71							99.96	
A3. III	1.162	.183	.004	.011	.011	.040	.080	.018									
5	67.42	15.88	1.37	1.14	1.43	3.49	6.42	2.65	0.05				0.07			99.92	
A3. III	1.124	.155	.009	.016	.036	.062	.103	.030					.001				
6	66.84	18.22	2.27	0.20	0.81	3.31	5.14	2.80	0.46				trace			100.05	
A3. III	1.114	.178	.014	.003	.020	.059	.083	.030					—				
7	69.93	14.95	1.78	0.55	0.60	1.46	5.30	3.99	0.32	0.12		0.33	0.33	trace	0.29	100.01	
A1. I	1.166	.147	.011	.008	.015	.022	.085	.042				.004	.002	—	.002		
8	66.28	16.21	0.80	2.06	1.57	3.53	4.36	3.20	0.78	0.12		0.50	0.20	trace	0.34	100.00	
A1. 1	1.105	.159	.005	.029	.049	.063	.070	.035				.006	.001	—	.002		
9	65.87	16.82	1.58	1.23	1.54	2.65	4.72	3.15	1.43			0.37		trace		99.36	2.62
1. III	1.098	.165	.010	.017	.039	.047	.076	.034				.004		—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 31.6 or 23.9 ab 30.4 an 6.4	di 1.4 hy 2.9	Cape Marsa, n. Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, M. Soc. Ph. Genev., XXXIII, p. 77, 1900.	Liparite.	
	Q 26.9 or 30.1 ab 33.5 an 5.0 C 0.7	hy 2.3	Teneriffe, Canary Islands.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 440, 1887,	Obsidian.	
	Q 27.0 or 22.8 ab 32.5 an 5.3 C 1.8	hy 1.5 mt 3.0	Amba Barra, Abyssinia.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 270, 1900.	Pitchstone.	
ZrO$_2$ trace FeS$_2$ 0.94 CuS 0.06 PbS 0.06	Q 28.9 or 38.4 ab 25.2 an 4.7	hy 0.8 ap 0.4 pr 0.9	Adadle, Somali Peninsula, East Africa.	Not stated. J. R. Hanhart?	A. Bodmer-Beder, cf. N. J., 1895, I, p. 318.	Granite.	
	Q 31.1 or 23.9 ab 30.9 an 7.5 C 1.2	hy 3.7 mt 0.7	Konyam Bay, Siberia.	Lindström.	Törnebohm, cf. N. J., 1885, I, p. 430.	Biotite-granite.	
	Q 24.7 or 25.6 ab 38.8 an 6.4	di 1.0 hy 3.7	Konyam Bay, Siberia.	Lindström.	Törnebohm, cf. N. J., 1885, I, p. 430.	Biotite-granite.	
	Q 22.4 or 39.4 ab 26.2 an 5.0	di 4.8 wo 1.0 mt 1.3	Lan Biang, Battak Plateau, Sumatra.	W. Herz.	L. Milch, Z. D. G. G., LI, p. 69, 1899.	Liparite.	
	Q 33.4 or 29.5 ab 31.4 an 5.6		Orr's Gully, Dargo, Victoria, Australia.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., 1887. cf. N. J., 1889, I, 121.	Aplite.	Sum high.

SUBRANG 4. DOSODIC. LASSENOSE.

	Q 25.3 or 13.9 ab 33.0 an 13.1 C 1.2	hy 3.7 mt 1.2 il 1.2 hm 4.8	Titus' Mill, Upham, New Brunswick.	W. D. Matthew.	W. D. Matthew, Tr. N. Y. Ac. Sc., XIV, p. 207, 1895.	Granite.	Mean of two.
	Q 32.1 or 10.0 ab 40.3 an 13.6 C 0.8	hy 2.3 mt 0.5	Moore's quarry, Florence, Massachusetts.	L. G. Eakins.	B. K. Emerson, M. U. S. G. S., XXIX, p. 316, 1898.	Granite.	
	Q 23.3 or 21.1 ab 44.0 an 6.1 C 0.6	hy 1.3 mt 0.7 il 1.7 hm 1.3	Marblehead Neck, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 292, 1899.	Rhyolite.	
	Q 28.6 or 10.0 ab 41.9 an 11.1 C 4.8	hy 2.0 mt 0.9	Kawishiwi River, Minnesota.	A. D. Meeds.	U. S. Grant, 21 A. R. G. Nh. S. Minn., p. 43, 1893.	Quartz-porphyry.	
	Q 11.9 or 16.7 ab 54.0 an 6.2	di 9.2 mt 2.1	Kekequabic Lake, Minnesota.	Dodge and Sidener.	U. S. Grant, 21 A. R. G. Nh. S. Minn., p. 41, 1893.	Augite-granite.	Also in A. G., XI, p. 385, 1893.
	Q 17.9 or 16.7 ab 43.5 an 16.4 C 0.6	hy 2.0 mt 0.7 hm 1.8	Kekequabic Lake, Minnesota.	Dodge and Sidener.	U. S. Grant, 21 A. R. G. Nh. S. Minn., p. 41, 1893.	Augite-granite.	Also in A. G., XI, p. 385, 1893.
SrO 0.06 Li$_2$O trace	Q 20.9 or 23.4 ab 44.3 an 5.6	hy 1.5 mt 0.9 il 0.6 hm 0.5	North part of Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S. 148, p. 142, 1897.	Granite-porphyry.	
SrO 0.05 Li$_2$O trace	Q 17.5 or 19.5 ab 36.7 an 15.0	di 2.0 hy 6.3 mt 1.2 il 0.9	Sweet Grass Creek, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S. 148, p. 142, 1897.	Porphyrite.	
	Q 18.0 or 18.9 ab 39.8 an 13.1 C 0.8	hy 4.5 mt 2.3 il 0.6	Castle, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S. 139, p. 106, 1896.	Porphyry.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
10	62.58	16.42	2.46	1.96	1.84	2.47	4.57	3.91	1.40	0.38	0.77	0.40	0.33	0.08	0.41	100.08	
A1. I	1.043	.161	.015	.028	.046	.045	.073	.041				.005	.002	.001	.003		
11	67.55	15.68	0.98	1.02	1.11	2.51	4.15	2.86	2.76	0.38	none	0.34	0.12	trace	0.11	99.65	
A1. I	1.126	.153	.006	.014	.028	.045	.062	.030				.004	.001	——	.001		
12	69.56	15.29	0.86	2.06	0.69	2.81	3.97	3.36	0.86			0.55	0.16			100.17	
A2. II	1.159	.150	.005	.029	.017	.050	.064	.036				.007	.001				
13	75.50	13.25	1.02	0.91	0.07	0.90	4.76	2.85	0.41			none	none	none		100.05	
A2. II	1.258	.130	.006	.012	.002	.016	.077	.031				——	——	——			
14	72.59	13.47	1.58	1.32	1.05	2.12	4.63	2.52	0.18			0.52		none		100.24	
A2. II	1.205	.132	.010	.018	.026	.038	.074	.026				.006		——			
15	70.52	15.85	2.28	0.36	0.09	2.59	3.93	3.43	0.35			trace	0.17	0.09		99.95	
A2. II	1.175	.155	.014	.005	.002	.047	.063	.036				——	.001	.001			
16	70.24	17.36	1.38	0.79	0.53	2.74	3.69	2.65	0.71		none	trace	trace	none		100.09	
A2. II	1.171	.170	.009	.011	.013	.049	.059	.029				——	——	——			
17	69.24	15.30	1.72	0.69	0.95	2.98	4.46	2.52	1.30			0.65	trace	trace		100.08	
A2. II	1.164	.150	.011	.010	.024	.053	.072	.027				.008	——	——			
18	67.95	14.98	2.33	0.95	1.42	3.98	4.39	2.86	0.61	0.45		0.45	0.07	0.09	0.23	100.79	
A1. I	1.133	.147	.015	.013	.036	.071	.071	.030				.006	.001	.001	.002		
19	67.49	16.18	1.30	1.22	1.34	2.68	4.37	2.40	2.69			0.13	0.13	0.08		100.01	
A2. II	1.125	.159	.008	.017	.034	.048	.070	.026				.002	.001	.001			
20	66.64	16.22	1.84	1.06	1.25	2.41	5.11	3.86	0.55	0.52	none	0.29	0.16	trace	0.27	100.34	
A1. I	1.111	.159	.012	.015	.031	.043	.082	.041				.004	.001	——	.002		
21	65.64	17.29	3.07	1.29	1.78	1.98	5.77	2.44	1.03		0.17	none	0.23	trace		100.73	
A2. II	1.094	.170	.019	.018	.045	.036	.093	.026				——	.002	——			
22	64.65	17.80	2.33	2.10	0.81	1.73	4.18	2.83	3.06			trace	trace	trace		100.09	
A2. II	1.078	.174	.014	.030	.020	.030	.068	.030				——	——	——			
23	67.78	16.67	1.99	0.51	0.71	2.67	4.91	3.43	1.44				0.19	trace		100.30	
A2. II	1.130	.163	.013	.007	.018	.048	.079	.036					.001	——			
24	66.45	15.84	2.59	1.43	1.21	2.90	3.92	2.89	0.84		1.35	0.10	0.36	0.09	none	100.09	2.670
A1. I	1.108	.155	.016	.020	.030	.051	.063	.031				.001	.002	.001	——		16°
25	63.02	17.61	1.78	2.76	1.63	3.30	4.72	3.23	2.03				0.16	trace	0.08	100.32	2.689
A2. II	1.050	.173	.011	.039	.041	.059	.076	.034					.001	——	.001		16.5°
26	67.49	17.76	2.54	0.08	0.35	1.67	5.03	4.40	0.52				trace	trace		99.84	
A3. III	1.125	.174	.015	.001	.009	.030	.080	.047					——	——			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO Li_2O	0.10 trace	Q 12.9 or 22.8 ab 38.3 an 12.5 C 0.2	hy 5.6 mt 3.5 il 0.8	Near Yogo Peak, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 514, 1900.	Syenite-porphyry.	
Cl SrO Li_2O	0.05 0.03 trace	Q 27.1 or 16.7 ab 32.5 an 12.5 C 1.6	hy 3.3 mt 1.4 il 0.6	Butte, Montana.	H. N. Stokes.	Weed and Tower, B. U. S. G. S. 168, p. 119, 1900.	Rhyolite-dacite-obsidian.	No ZrO_2 or SO_3.
		Q 25.5 or 20.0 ab 33.5 an 13.9	hy 3.9 mt 1.2 il 1.1	Schafer Butte, Boise County, Idaho.	G. Steiger.	W. Lindgren, 20 A. R. U. S. G. S., III, p. 81, 1900.	Granite.	
SO_3 Li_2O	0.32 0.06	Q 34.2 or 17.2 ab 40.3 an 4.4 C 0.6	hy 1.1 mt 1.4	Obsidian Cliff, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, B. U. S. G. S. 150, p. 160, 1898.	Rhyolite.	SO_3 for S? Near kallerudose.
FeS_2	0.26	Q 30.4 or 14.5 ab 38.8 an 8.9	di 1.4 hy 2.2 mt 2.3 il 0.9	East of Willow Park, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 426, 1899.	Obsidian.	
SO_3 Li_2O	0.29 trace	Q 29.1 or 20.0 ab 33.0 an 13.1	hy 0.2 mt 1.2 hm 1.4	Bunsen Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 87, 1899.	Mica-dacite-porphyry.	SO_3 for S?
SO_3 Cl Li_2O	trace none none	Q 31.9 or 16.1 ab 30.9 an 13.6 C 3.4	hy 1.3 mt 2.3	Birch Hills, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 163, 1899.	Mica-dacite-porphyry.	
SO_3 Cl Li_2O	0.27 trace none	Q 26.6 or 15.0 ab 37.7 an 14.2	hy 2.4 mt 0.5 il 1.2 hm 1.4	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., p. 627, 1891.	Quartz-mica-diorite-porphyrite.	SO_3 for S?
SO_3 SrO	0.11 trace?	Q 22.4 or 16.7 ab 37.2 an 11.8	di 5.4 hy 1.1 mt 1.9 il 0.8 hm 1.1	Sepulchre Mountain, Yellowstone National Park.	T. M. Chatard.	J. P. Iddings, M. U. S. G. S., XXXII, p. 272, 1899.	Andesite-breccia.	Breccia. SO_3 for S?
		Q 24.6 or 14.5 ab 36.7 an 13.3 C 1.5	hy 4.6 mt 2.0	Sepulchre Mountain, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, 12 A. R. U. S. G. S., p. 648, 1891.	Dacite.	
ZrO_2 S Cr_2O_3 V_2O_3 SrO	0.01 trace trace 0.01 0.14	Q 15.6 or 22.8 ab 43.0 an 10.0	di 1.6 hy 2.7 mt 2.8 il 0.5	Sulphur Creek Basin, Yellowstone National Park.	W. F. Hillebrand.	Hague and Jaggar, B. U. S. G. S 168, p. 95, 1900.	Syenite-porphyry.	No NiO.
SO_3 Cl	trace trace	Q 15.8 or 14.5 ab 48.7 an 10.0 C 1.5	hy 4.5 mt 4.4	Gray Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 81, 1899.	Andesite-porphyry.	
SO_3 Li_2O	0.43 0.17	Q 23.6 or 16.7 ab 35.6 an 8.3 C 4.7	hy 4.2 mt 3.2	Elk Creek, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 325, 1899.	Trachytic rhyolite.	
		Q 19.0 or 20.0 ab 41.4 an 13.3 C 1.0	hy 1.9 mt 2.5	Garfield Peak, Wyoming.	L. G. Eakins.	W. Cross, B. U. S. G. S. 148, p. 116, 1897.	Dacite?	
Cl SrO Li_2O	0.05 0.07 trace	Q 24.5 or 17.2 ab 33.0 an 14.2 C 1.0	hy 3.5 mt 3.7	Mount Lincoln, Leadville, Colorado.	W. F. Hillebrand.	W. Cross, M. U. S. G. S., XII, p. 332, 1886.	Porphyry.	
		Q 12.2 or 18.9 ab 39.8 an 16.4 C 0.4	hy 7.7 mt 2.6	McNulty Gulch, Leadville, Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S. 148, p. 176, 1897.	Diorite-porphyry.	Not fresh. Near laurvikose.
		Q 17.6 or 26.1 ab 41.9 an 8.3 C 1.7	hy 0.9 hm 2.6	Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 324, 1896.	Mica-dacite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
27	66.46	17.91	2.42	0.35	0.49	2.89	4.79	3.74	1.01					trace		100.06	
A3. III	1.108	.175	.015	.005	.012	.051	.077	.039						—			
28	68.30	16.24	1.60	1.63	1.05	2.79	3.90	3.52	0.71			n. d.	0.13	0.12	trace	100.03	
A2. II	1.138	.159	.010	.022	.026	.050	.063	.037				—	.001	.002	—		
29	65.71	18.30	1.19	1.53	0.98	2.17	5.00	3.95	1.39					0.02		100.24	
A3. III	1.095	.179	.007	.021	.025	.039	.080	.042						—			
30	62.65	16.68	2.35	2.63	1.43	4.96	4.45	2.75	0.66	0.27		0.42	0.28	0.16	0.13	99.93	
A1. I	1.044	.163	.015	.036	.036	.088	.072	.030				.005	.002	.002	.001		
31	65.78	17.32	3.68	0.46	0.47	1.66	5.23	4.64	0.14			0.27	0.13	0.32		100.10	
A2. II	1.096	.170	.023	.007	.012	.030	.084	.049				.003	.001	.005			
32	64.82	18.27	3.48	0.56	0.85	2.89	5.05	2.67	0.20			0.56	0.23	0.20		99.78	
A2. II	1.080	.179	.022	.008	.021	.052	.081	.028				.007	.002	.003			
33	67.01	17.91	1.30	n. d.	0.42	1.86	5.33	4.56	0.48	0.16	none	0.10	trace	trace	0.60	99.86	
A2. II	1.117	.176	.008	(.016)	.011	.033	.085	.049				.001	—	—	.004		
34	71.87	14.53	1.28	1.02	0.48	1.59	5.08	2.84	0.22	0.06	none	0.41	0.10	trace	0.08	99.63	
A1. I	1.198	.142	.008	.014	.012	.029	.082	.030				.005	.001	—	.001		
35	70.77	14.83	1.35	1.25	0.64	2.12	5.07	2.68	0.33	0.07	none	0.38	0.13	trace	0.08	99.88	
A1. I	1.176	.145	.009	.018	.016	.038	.082	.029				.005	.001	—	.001		
36	70.10	15.18	1.78	1.09	0.74	2.27	5.15	2.58	0.19	0.10	none	0.48	0.13	trace	0.08	99.97	
A1. I	1.168	.149	.011	.015	.019	.041	.083	.027				.006	.001	—	.001		
37	68.17	15.60	2.31	0.94	1.02	2.76	5.15	2.46	0.45	0.09	none	0.54	0.13	trace	0.06	99.71	
A1. I	1.136	.153	.014	.013	.026	.049	.083	.026				.007	.001	—	—		
38	69.36	16.23	0.88	1.53	1.34	3.17	4.06	3.02	0.45							100.04	
A3. III	1.156	.159	.005	.021	.034	.057	.065	.032									
39	68.72	15.15	1.16	1.76	1.28	3.30	4.26	2.78	0.74	—		0.31	0.09	0.11	0.07	99.76	
A1. I	1.145	.148	.007	.025	.032	.059	.069	.030				.004	.001	.002	—		
40	68.32	15.26	1.66	1.26	1.32	3.26	4.27	2.81	1.37	—		0.31	0.12	0.04	0.07	100.07	
A1. I	1.139	.150	.010	.018	.033	.058	.069	.030				.004	.001	—	—		
41	69.51	15.75	3.34	n. d.	2.09	1.71	3.89	3.34	0.56				trace			100.19	
A4. IV	1.159	.154	.021	(.042)	.052	.030	.063	.035					—				
42	68.10	15.50	3.20	none	0.10	3.02	4.20	3.13	2.72	—		0.15	0.03	trace	0.06	100.21	
A1. I	1.135	.152	.020	—	.008	.053	.068	.033				.002	—	—	—		
43	67.89	17.29	2.39	0.21	0.66	3.01	5.11	1.69	1.34	—		0.21	0.12	0.12	0.03	100.11	
A1. I	1.132	.169	.015	.003	.017	.053	.082	.018				.003	.001	.002	—		

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 17.9 or 21.7 ab 40.3 an 14.2 C 0.8	hy 1.2 mt 1.2 hm 1.6	Bald Mountain, Rosita, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 324, 1896.	Dacite.	
SrO Li_2O	0.04 trace	Q 24.0 or 20.6 ab 33.0 an 13.9 C 0.9	hy 4.3 mt 2.3	Chicago Mountain, Tenmile District, Colorado.	W. F. Hillebrand.	W. Cross, 14 A. R. U. S. G. S., p. 227, 1894.	Quartz-porphyrite.	
		Q 14.8 or 23.4 ab 41.9 an 10.8 C 1.8	hy 4.3 mt 1.6	Crested Butte, West Elk Mountains, Colorado.	L. G. Eakins.	W. Cross, 14 A. R. U. S. G. S., p. 227, 1894.	Quartz-porphyrite.	
SrO Li_2O	0.11 trace	Q 13.9 or 16.7 ab 37.7 an 17.0	di 5.4 hy 2.6 mt 3.5 il 0.8	Hermano Peak, Sierra El Late, Colorado.	W. F. Hillebrand.	W. Cross, 14 A. R. U. S. G. S., p. 227, 1894.	Hornblende-porphyrite.	Near yellowstonose and subrang 4 of adamellase.
		Q 13.6 or 27.2 ab 44.0 an 8.3 C 0.7	hy 1.2 mt 0.9 il 0.5 hm 3.0	San Mateo Mountain, Mount Taylor region, New Mexico.	T. M. Chatard.	J. S. Diller, B. U. S. G. S. 148, p. 185, 1897.	Mica-andesite.	
		Q 18.0 or 15.6 ab 42.4 an 14.5 C 2.0	hy 2.2 il 1.1 hm 3.5	San Francisco Mountains, Arizona.	T. M. Chatard.	B. U. S. G. S. 148, p. 188, 1897.	Hypersthene-andesite.	Not described.
SrO Li_2O	0.13 none	Q 13.2 or 27.2 ab 44.5 an 9.2 C 0.9	hy 3.2	Fortymile Creek, n. Canyon Creek, Alaska.	H. N. Stokes.	J. E. Spurr, A. G., XXV, p. 231, 1900.	Alaskite-porphyry.	
ZrO_2 Cl SrO	0.04 trace 0.03	Q 27.4 or 16.7 ab 43.0 an 8.1	hy 1.2 mt 1.4 il 0.8	Below Llao Rock, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, B. U. S. G. S. 168, p. 222, 1900.	Rhyolite.	No SO_3, S, Cr_2O_3 or NiO.
ZrO_2 Cl SrO	0.05 0.11 0.02	Q 25.1 or 16.1 ab 43.0 an 9.5	di 1.3 hy 1.6 mt 2.1 il 0.8	Llao Rock Flow, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, B. U. S. G. S. 168, p. 222, 1900.	Rhyolite.	No SO_3, S, Cr_2O_3 or NiO.
ZrO_2 Cl SrO	0.04 0.03 0.03	Q 24.7 or 15.0 ab 43.5 an 10.8	hy 1.9 mt 2.6 il 0.6	Cleetwood Cove, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, B. U. S. G. S. 168, p. 222, 1900.	Rhyolite.	No SO_3, S, Cr_2O_3 or NiO.
Cl SrO	trace 0.03	Q 21.8 or 14.6 ab 43.5 an 12.2	di 1.1 hy 2.1 mt 1.1 il 1.4 hm 1.1	Near Wine Glass Grotto, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, B. U. S. G. S. 168, p. 222, 1900.	Rhyolite.	No ZrO_2, SO_3, S, Cr_2O_3 or NiO
		Q 24.6 or 17.8 ab 34.1 an 15.8 C 0.5	hy 5.5 mt 1.2	Four miles northwest of Lassen's Peak, California.	J. W. Shimer.	Hague and Iddings, A. J. S., XXVI, p. 232, 1883.	Dacite.	
SrO Li_2O	0.03 trace	Q 23.8 or 16.7 ab 36.2 an 13.6	di 2.3 hy 4.0 mt 1.6 il 0.6	East end of Chaos, Lassen's Peak, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S. 150, p. 218, 1898.	Dacite.	Dried at 100°.
SrO Li_2O	trace trace	Q 23.9 or 16.7 ab 36.2 an 14.2	di 1.6 hy 3.1 mt 2.3 il 0.6	West base of Lassen's Peak, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S. 150, p. 218, 1898.	Dacite.	Dried at 100°.
		Q 25.0 or 19.5 ab 33.0 an 8.3 C 2.7	hy 10.7	Southeast base of Lassen's Peak, California.	T. M. Chatard.	J. S. Diller, B. U. S. G. S. 150, p. 218, 1898.	Dacite.	
SrO Li_2O	trace none	Q 25.4 or 18.3 ab 35.6 an 14.2	hy 0.7 hm 3.2 tn 0.4	Bear Creek Falls, Shasta County, California.	R. B. Riggs.	J. S. Diller, B. U. S. G. S. 150, p. 215, 1898.	Dacite.	Dried at 105°.
SrO	0.04	Q 24.5 or 10.0 ab 43.0 an 14.7 C 1.6	hy 1.7 il 0.4 hm 2.4	Near Buntingville, Lassen County, California.	T. M. Chatard.	J. S. Diller, B. U. S. G. S. 148, p. 195, 1897.	Hornblende-andesite.	Dried at 105°.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
44	66.30	17.55	2.19	0.55	0.97	3.12	5.15	2.45	1.25			trace	0.15	trace		99.96	
A2. II	1.105	.173	.014	.008	.024	.055	.083	.026				—	.001	—			
45	70.36	15.47	0.98	1.17	0.87	3.18	4.91	1.71	1.00	0.06		0.20	0.11	trace	0.06	100.08	
A1. I	1.173	.152	.007	.017	.022	.057	.079	.018				.003	.001	—	—		
46	73.00	16.38	none	0.99	0.48	2.42	4.53	1.87	0.52							100.19	
A3. III	1.216	.161	—	.014	.012	.043	.072	.020									
47	71.19	13.81	1.45	1.68	0.74	2.87	4.24	1.82	0.92	0.15	0.82	0.35	0.08	0.07	0.16	100.35	
A1. I	1.187	.135	.009	.024	.019	.051	.068	.019				.004	.001	.001	.001		
48	68.65	16.34	0.93	1.48	1.29	3.07	4.85	1.85	0.62	0.24		0.28	0.15	0.08	0.09	99.99	
A1. I	1.144	.161	.006	.020	.032	.055	.078	.020				.004	.001	.001	.001		
49	73.18	13.66	0.21	2.24	0.93	2.10	3.70	2.72	0.57	0.10	0.17	0.25	0.09	0.07	0.10	100.09	
A1. I	1.220	.134	.001	.031	.023	.038	.059	.029				.003	.001	.001	.001		
50	71.88	15.57	1.07	0.30	0.68	2.03	5.81	1.80	0.68	0.11	none	0.17	0.08	none	0.02	100.28	
A1. I	1.198	.153	.007	.004	.017	.036	.093	.019				.002	.001	—	—		
51	66.28	16.03	1.80	1.88	1.12	3.75	4.10	3.49	0.39	0.10		0.54	0.30	0.05	0.08	99.91	
A1. I	1.104	.157	.011	.027	.028	.067	.066	.037				.007	.002	.001	.001		
52	70.09	15.13	1.72	1.13	1.22	2.61	3.61	2.75	0.78	—	trace	0.67	0.11	0.08	none	99.98	
A1. I	1.168	.148	.004	.015	.031	.047	.058	.030				.008	.001	.001	—		
53	69.56	15.65	1.24	0.91	0.82	2.52	4.09	2.19	2.92				0.13			100.03	2.45
A3. III	1.159	.153	.007	.012	.021	.045	.066	.023					.001				
54	69.43	15.74	0.93	3.35	1.35	2.07	4.56	2.99	0.10							100.52	
A3. III	1.157	.154	.006	.047	.034	.038	.073	.032									
55	73.40	12.90	3.70	n. d.	0.14	2.35	3.83	2.99	0.43			0.43				100.17	
A4. IV	1.223	.126	.023	(.046)	.004	.042	.061	.032				.005					
56	68.12	12.13	n. d.	1.03	trace	1.63	5.34	1.69	9.70					trace		99.64	
A4. IV	1.136	.119	—	.014	—	.029	.085	.018						—			
57	74.80	13.89	trace	none	0.05	2.59	5.45	2.74	0.77							100.29	
A3. III	1.247	.136	—	—	.001	.047	.088	.029									
58	70.47	13.36	0.42	0.91	0.54	1.04	4.01	3.47	6.10					0.21		100.53	
A3. III	1.175	.131	.003	.012	.014	.019	.064	.037						.003			
59	73.47	15.42	1.02	n. d.	0.20	1.35	5.57	3.64	n. d.			0.12				100.79	
A3. III	1.225	.151	.006	(.012)	.005	.024	.090	.038				.002					
60	64.98	19.50	2.51	0.30	0.50	3.70	6.09	2.01	n. d.							99.59	
A3. III	1.083	.191	.015	.004	.013	.066	.098	.022									

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3	0.28	Q 19.0 or 14.5 ab 43.5 an 15.3 C 0.9	hy 2.4 mt 3.2	East Fork of Clear Creek, Shasta County, California.	J. E. Whitfield.	J. S. Diller, B. U. S. G. S. 148, p. 191, 1897.	Dacite-porphyry.	
SrO Li_2O	trace trace	Q 27.1 or 10.0 ab 41.4 an 15.3	hy 3.1 mt 1.6 il 0.5	Near Enterprise, Butte County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., p. 482, 1894.	Quartz-diorite.	
		Q 33.1 or 11.1 ab 37.7 an 12.0 C 2.7	hy 3.1	Rocklin, Placer County, California.	W. H. Melville.	W. Lindgren, B. U. S. G. S. 150, p. 172, 1898.	Granite.	
SrO	trace	Q 32.2 or 10.6 ab 35.6 an 13.3	di 0.8 hy 3.0 mt 2.1 il 0.6	Near Milton, Calaveras County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 484, 1894.	Quartz-porphyrite.	
SrO Li_2O	0.07 trace	Q 24.2 or 11.1 ab 40.9 an 15.3 C 0.8	hy 4.5 mt 1.4 il 0.6	Indian Valley, Sierra County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 721, 1896.	Granodiorite.	Also in J. G., III, p. 403, 1895.
SrO Li_2O	trace trace	Q 34.0 or 16.1 ab 30.9 an 10.6 C 0.8	hy 5.9 mt 0.2 il 0.5	Agua Fria Creek, Mariposa County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 691, 1896.	Soda granite.	
SrO Li_2O	0.08 none	Q 26.3 or 10.6 ab 48.7 an 10.0 C 0.5	hy 1.7 mt 0.5 il 0.3 hm 0.8	Merced River, Mariposa County, California.	G. Steiger.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 721, 1896.	Soda-granite-porphyry.	
SrO Li_2O	trace trace	Q 19.6 or 20.6 ab 35.6 an 15.0	di 3.0 hy 2.7 mt 3.5	Lake Tenaya, Mariposa County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 482, 1894.	Granodiorite.	
ZrO_2 Cl FeS_2 CoO Cu Pb	trace 0.02 0.02 none 0.04 none	Q 30.7 or 16.7 ab 30.4 an 13.1 C 1.3	hy 3.2 mt 0.9 il 1.2	Mazaruni district, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. contrib.	Granitite-gneiss.	Dried at 100°.
		Q 30.5 or 12.8 ab 34.6 an 12.5 C 2.0	hy 2.8 mt 1.6	Guaitara Slope, Loma de Ales, Colombia.	R. Küch.	R. Küch, N. J., 1886, I, p. 48.	Biotite-hornblende-dacite.	
		Q 22.5 or 17.8 ab 38.3 an 10.6 C 1.1	hy 9.0 mt 1.4	Juncal Valley, Argentina.	H. Schlapp.	A. Stelzner, Btr. G. Arg. Rep., I, p. 208, 1885.	"Andengranit."	
		Q 32.7 or 17.8 ab 32.0 an 9.2	di 2.2 hy 4.8 il 0.8	Hlidharfjall, n. Myvatn, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 663, 1890.	Obsidian.	
		Q 27.5 or 10.0 ab 44.5 an 7.2	di 3.4	Berufjord, Iceland.	C. W. Schmidt.	C. W. Schmidt, Z. D. G. G., XXXVII, p. 778, 1885.	Pitchstone.	Much H_2O.
		Q 28.7 or 16.1 ab 46.1 an 5.2	wo 3.3	Stanner, n. Old Radnor, Wales.	G. A. J. Cole.	G. A. J. Cole, G. M., XXIII, p. 223, 1886.	Quartz-felsite.	
		Q 30.5 or 20.6 ab 33.5 an 5.3 C 1.1	hy 2.6 mt 0.7	Puerto de Genoves, Cabo de Gata, Spain.	A. Osann.	A. Osann, Z. D. G. G., XLIII, p. 689, 1891.	Liparite.	Pumice.
		Q 23.5 or 21.1 ab 47.2 an 6.7	hy 2.1	Birkrem, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb. 1896, No. 5, p. 96.	Hypersthene-granite.	Much H_2O.
		Q 13.1 or 12.2 ab 51.4 an 18.3 C 0.5	hy 1.3 mt 0.9 hm 1.8	Presten, Lofoten Islands, Norway.	T. Matthiessen.	C. F. Kolderup, Berg. Mus. Aarb. 1898, No. 7, p. 28.	Oligoclase rock	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
61	68.19	16.88	1.63	n. d.	1.07	2.19	5.34	3.03	1.37					0.14		99.84	
A3. III	1.137	.166	.010	(.020)	.027	.039	.085	.032						.002			
62	66.46	17.72	2.13	n. d.	0.95	3.44	4.96	2.86	1.50					0.13		100.15	
A3. III	1.108	.173	.013	(.026)	.024	.061	.080	.030						.002			
63	70.28	14.93	1.42	1.34	0.76	3.29	4.57	2.62	1.44					0.06		100.71	
A3. III	1.171	.146	.009	.018	.019	.059	.074	.027						.001			
64	60.45	15.93	2.57	2.90	1.62	2.77	4.29	2.77	3.28		1.77	1.17	0.21			99.86	2.643
A2. II	1.008	.156	.016	.040	.041	.050	.069	.030				.014	.001				
65	71.27	13.91	2.42	0.37	0.77	3.03	5.45	1.47	0.78					0.51		99.98	2.529
A3. III	1.188	.136	.015	.005	.019	.053	.088	.016						.007			
66	69.73	15.97	1.27	1.23	0.68	3.28	5.30	1.76	0.53	none			0.21			99.96	
A3. III	1.162	.156	.008	.017	.017	.059	.085	.019					.001				
67	68.95	16.13	2.53	0.99	0.42	1.29	5.36	3.28	1.29			0.30				100.54	2.659
A3. III	1.149	.158	.015	.014	.011	.023	.086	.035				.004					
68	68.11	15.80	1.97	1.87	0.96	2.43	4.41	2.80	0.54	0.16		0.07	0.62			99.87	2.665
A2. II	1.135	.155	.013	.027	.024	.043	.071	.030				.001	.004				15°
69	71.74	14.12	1.75	0.59	1.34	2.32	3.65	2.85	1.45							99.81	
A3. III	1.196	.138	.011	.008	.034	.041	.059	.031									
70	69.90	14.73	n. d.	2.90	0.72	1.91	4.30	3.01	2.10							99.57	
A4. IV	1.165	.144	——	.040	.018	.034	.069	.032									
71	72.19	12.56	3.65	n. d.	2.52	4.41	3.35	0.40	0.08							100.01	
A4. IV	1.203	.123	.023	(.046)	.045	.071	.036	.004									
72	75.02	12.86	1.50	n. d.	0.95	1.05	5.01	2.28	0.90							99.57	
A3. III	1.250	.126	.009	(.018)	.024	.019	.080	.024									
73	69.71	16.51	1.50	n. d.	0.34	1.89	4.56	1.35	3.85							99.71	
A3. III	1.162	.162	.009	(.018)	.008	.034	.073	.014									
74	65.97	17.50	2.17	n. d.	1.20	2.69	4.41	1.76	4.19							99.89	
A4. IV	1.100	.172	.014	(.028)	.030	.048	.071	.018									
75	67.80	16.92	1.05	1.94	1.31	3.25	4.36	3.35	0.33					0.35		100.66	
A3. III	1.130	.166	.006	.027	.033	.058	.070	.036						.005			
76	76.19	13.42	0.41	n. d.	trace	1.35	4.57	2.63	1.15							99.72	
A3. III	1.270	.131	.003	(.006)	——	.024	.074	.028									
77	69.44	15.21	1.74	0.56	0.93	1.99	5.11	4.53	0.77							100.28	
A3. III	1.157	.149	.011	.008	.023	.036	.082	.048									

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 18.6 or 17.8 ab 44.5 an 10.8 C 1.0	hy 5.4	Various localities in Smaland, Sweden.	H. Santesson.	O. Nordenskjöld, B.G.Inst.Un. Ups., I, p. 177, 1894.	Quartz-syenite-porphyry.	Average of several specimens.
		Q 16.6 or 16.8 ab 41.9 an 17.0 C 0.2	hy 5.9	Sjögelö region, Smaland, Sweden.	H. Santesson.	O. Nordenskjöld, B.G.Inst.Un. Ups., I, p. 194, 1894.	Eorhyolite.	Average of several specimens.
FeS$_2$	1.34	Q 26.0 or 15.0 ab 38.8 an 12.5	di 3.2 hy 1.6 mt 2.1 pr 1.3	Lammersdorf, near Aachen, Rh. Prussia.	L. Schmidt.	Dannenberg and Holzapfel, Jb. Pr. G. L-A., XVIII, p. 13, 1898.	Granite.	
SO$_3$ Org	0.10 0.03	Q 15.8 or 16.7 ab 36.2 an 13.9 C 0.7	hy 5.4 mt 3.7 il 2.2	Munster am Stein, Rh. Prussia.	Gremse.	K. A. Lossen, Z. D. G. G., XLIII, p. 537, 1891.	Quartz-porphyry.	SO$_3$ for S. Not fresh.
		Q 27.6 or 8.9 ab 46.1 an 8.9	di 4.4 mt 1.2 hm 1.6	Hirtenberg, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kt. Hessen, I, Bl. Rossdorf, p. 35, 1886.	Granite.	
		Q 24.1 or 10.6 ab 44.5 an 14.5	di 1.5 hy 2.2 mt 1.9	Melibocus, Odenwald, Hesse.	R. Marzahn.	Chelius and Klemm, Erl. G. Kt. Hesse, X, p. 42, 1896.	Granite.	
		Q 22.0 or 19.5 ab 45.1 an 6.4 C 1.4	hy 1.1 mt 2.6 il 0.5 hm 0.6	Mühlenthal, near Magdeburg, Saxony.	Bodländer.	F. Klockmann, Jb. Pr. G. L-A., XI, p. 176, 1892.	Quartz-porphyry.	
SO$_3$	0.13	Q 25.9 or 16.7 ab 37.2 an 8.3 C 2.4	hy 4.3 mt 3.0 ap 1.4	Mühlberg, Odenwald, Hesse.	Not stated.	C. Chelius, cf. N. J. 1884, II, p. 419.	Granite.	
		Q 32.4 or 17.2 ab 30.9 an 11.4 C 0.7	hy 3.3 mt 1.9 hm 0.5	Bärndorf, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 156, 1899.	Granitite.	
		Q 26.0 or 17.8 ab 36.2 an 9.5 C 0.9	hy 7.1	Vincenzo, Campiglia Marittima, Tuscany.	C. Dalmer.	C. Dalmer, N. J., 1887, II, p. 213.	Quartz-trachyte.	
		Q 26.0 or 20.0 ab 37.2 an 4.4	di 7.0 hy 4.7	Basiluzzo Island, Æolian Islands.	F. Glaser.	A. Bergeat, Abh. Münch. Ak., XX, p. 61, 1899.	Obsidian.	
		Q 32.8 or 13.3 ab 41.9 an 5.3 C 0.3	hy 4.8	Mount Kastel, Crimea, Russia.	R. Prendel.	R. Prendel, cf. N. J., 1887, II, p. 95.	Liparite.	
		Q 32.8 or 7.8 ab 38.3 an 9.5 C 4.2	hy 3.2	n. Alouchta, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. 7 Cong., G. Int., XXXIII, p. 27, 1897.	Quartz-porphyrite.	
		Q 24.7 or 10.0 ab 37.2 an 13.3 C 3.6	hy 6.7	Charkha, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. 7 Cong., G. Int., XXXIII, p. 27, 1897.	Keratophyr.	
		Q 19.4 or 20.0 ab 36.7 an 16.1	hy 6.0 mt 1.4	Mount Elbruz, Caucasus.	A. Dannenberg.	A. Dannenberg, T. M. P. M., XIX, p. 233, 1900.	Dacite.	Segregation in other dacite.
		Q 35.8 or 15.6 ab 38.8 an 7.8 C 0.5	hy 0.9	Unga Island, Kamchatka, Siberia.	P. Wenjukoff.	P. Wenjukoff, cf. N. J., 1891, I, p. 281.	Liparite.	
		Q 17.9 or 26.7 ab 43.0 an 5.3	di 3.7 hy 0.6 mt 1.9 hm 0.2	Porobbo, Toba Lake, Sumatra.	W. Herz.	L. Milch, Z. D. G. G., LI, p. 69, 1899.	Quartz-trachyte-andesite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
78	71.29	15.70	1.50	0.30	0.89	3.41	4.81	2.35	0.07					trace		100.32	
A3. III	1.188	.154	.009	.004	.022	0.55	.077	.025						—			
79	72.70	13.85	2.50	n. d.	0.94	3.24	4.60	2.46	n. d.				trace	trace		100.39	
A4. IV	1.212	.136	,016	(.032)	.024	.059	.074	.026					—	—			

RANG 2. DOMALKALIC. TOSCANASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	74.21	14.47	0.35	0.50	0.28	1.71	7.62	0.10	0.23	0.15		0.30	0.07	none	none	99.99	
A1. I	1.236	.142	.002	.007	.007	.030	.122	.001				.004	.001	—	—		
2	67.88	17.21	2.00	1.62	1.52	3.08	5.71	0.26	0.45	—	none	0.20	0.10	0.09		100.12	
A2. II	1.131	.169	.013	.022	.038	.055	.092	.003				.002	.001	.001			
3	67.62	17.03	1.30	1.71	1.51	3.11	5.86	0.63	0.50	—	0.10	0.34	0.01	trace		99.72	2.684
A2. II	1.127	.167	.008	.024	.038	.055	.091	.007				.004	—	—			

RANG 3. ALKALICALCIC. COLORADASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	64.34	17.87	2.55	n. d.	trace	3.06	1.63	4.52	6.19							100.14	
A4. IV	1.072	.175	.016	(.032)	—	.054	.026	.048									

RANG 3. ALKALICALCIC. COLORADASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	64.05	15.38	2.20	2.74	2.08	4.30	2.74	4.00	0.83	0.27	0.35	0.60	0.21	0.11	0.08	100.06	
A1. I	1.068	.150	.014	.038	.052	.077	.044	.042				.007	.002	.002	.001		
2	63.88	15.84	2.11	2.59	2.13	3.97	2.81	4.23	0.66	0.22		0.65	0.21	0.07	0.09	99.82	
A1. I	1.065	.155	.013	.036	.053	.071	.045	.045				.008	.002	.001	.001		
3	62.53	19.01	1.96	1.44	1.29	5.17	3.45	3.30	0.45	0.21	none	0.65	0.17	0.03	0.13	99.83	
A1. I	1.042	.186	.013	.020	.032	.093	.056	.035				.008	.002	—	.001		
4	65.36	15.48	3.09	1.21	1.53	4.14	3.58	3.41	0.70	0.82		0.52	0.25	0.19	0.08	100.36	
A1. I	1.089	.152	.020	.017	.038	.074	.058	.036				.006	.002	.002	.001		
5	63.91	17.07	4.39	1.51	0.81	4.47	3.48	3.74	0.33				0.21			99.92	2.751
A3. III	1.065	.167	.027	.021	.020	.080	.056	.039					.001				14°
6	65.68	15.87	1.78	1.25	1.79	3.50	3.20	3.37	3.10			0.93	0.23			100.75	
A2. II	1.095	.155	.011	.018	.045	.062	.051	.036				.012	.002				
7	65.13	15.73	2.24	1.86	1.49	3.62	2.93	3.96	1.91	0.52		0.58	0.23	trace		100.27	
A2. II	1.086	.154	.014	.026	.037	.061	.047	.042				.007	.002	—			
8	67.45	15.51	1.76	2.21	1.10	3.60	3.47	3.66	0.63	0.14		0.58	0.12			100.25	
A2. II	1.124	.152	.011	.031	.028	.064	.056	.039				.007	.001				

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 26.8 or 13.9 ab 40.3 an 14.5	di 0.7 hy 1.9 mt 0.9 hm 0.8	Lyttleton, Banks Peninsula, New Zealand.	P. Marshall.	P. Marshall, Tr. N. Z. Inst., XXVI, p. 379, 1894.	Tridymite-trachyte.	Mean of 3.
		Q 27.7 or 14.5 ab 38.8 an 10.0	di 5.5 hy 4.0	Lyttleton, Banks Peninsula, New Zealand.	P. Marshall.	P. Marshall, Tr. N. Z. Inst., XXVI, p. 379, 1894.	Tridymite-trachyte.	Mean of 2.

SUBRANG 5. PERSODIC. MARIPOSOSE.

SrO Li_2O	trace trace	Q 26.5 or 0.6 ab 63.9 an 5.3	di 1.9 wo 0.4 mt 0.5 il 0.6	Near Mariposa, Mariposa County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 721, 1896.	Aplite.	Also in J. G., III, p. 403, 1895.
		Q 24.2 or 1.7 ab 48.2 an 15.3 C 1.9	hy 5.0 mt 3.0	Towakaima Falls, Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, R. G. N. W. Distr., II, 1898, p. 10.	Granite.	Dried at 100°.
		Q 21.7 or 3.9 ab 49.3 an 15.3 C 1.1	hy 5.4 mt 1.9 il 0.6	Essequibo, etc., rivers, British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, R. G. Ess. rivers, 1900, p. 52.	Granophyre.	Average sample. Dried at 100°. Alkalies?

SUBRANG 2. DOPOTASSIC.

		Q 29.3 or 26.7 ab 13.6 an 15.0 C 4.8	hy 4.2	Scogliatelle, Ponza Island, Italy.	G. Aichino.	V. Sabatini, B. C. G. I., XXIV, p. 252, 1893.	Retinite.	

SUBRANG 3. SODIPOTASSIC. AMIATOSE.

S SrO Cu	0.07 0.04 0.01	Q 20.0 or 23.4 ab 23.1 an 20.6	di 0.8 hy 5.2 mt 3.2 il 1.2	Gagnon Mine, Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899.	Granite.	Complete in B. U.S.G.S., 168, p. 117, 1900.
SO_3 Cl SrO	0.34 trace 0.02	Q 19.3 or 25.0 ab 23.6 an 18.1	di 1.3 hy 6.7 mt 4.2	Walkerville Station, Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899.	Granite.	Near harzose. Complete in B. U.S.G.S., 168, p. 116, 1900.
SO_3 SrO Li_2O	none 0.04 trace	Q 16.7 or 19.5 ab 29.3 an 25.9 C 0.2	hy 3.2 mt 3.0 il 1.1	Hiawatha Creek, Butte District, Montana.	H. N. Stokes.	Weed and Tower, B. U. S. G. S., 168, p. 119, 1900.	Andesite-porphyry.	
		Q 20.6 or 20.0 ab 30.4 an 19.2	di 1.1 hy 3.3 mt 2.6 il 0.9 hm 1.4	Mount Carbon, West Elk Mountains, Colorado.	T. M. Chatard.	W. Cross, 14 A. R. U. S. G. S., p. 227, 1894.	Quartz-porphyrite.	
		Q 19.4 or 21.7 ab 29.3 an 20.0	di 1.8 hy 1.2 mt 4.9 hm 1.0	Sultan Mountain, San Juan County, Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S., 148, p. 180, 1897.	Augite-diorite.	Dried at 100°.
		Q 24.2 or 20.0 ab 26.7 an 17.2 C 0.6	hy 4.5 mt 1.4 il 1.8 hm 0.8	Waller Defeat shaft, Washoe, Nevada.	G. E. Moore.	G. F. Becker, M. U. S. G. S., III, p. 282, 1882.	Mica-andesite.	Also in Hague and Iddings, B. U. S. G. S., 17, p. 33, 1885.
NiO	0.07	Q 22.9 or 23.4 ab 24.6 an 17.8 C 0.1	hy 4.4 mt 3.2 il 1.1	S. of Carbon Ridge, Eureka District, Nevada.	W. H. Melville.	Hague and Iddings, M. U. S. G. S., XX, p. 264, 1892.	Andesitic perlite.	
		Q 23.5 or 21.7 ab 29.3 an 15.8	di 1.6 hy 3.7 mt 2.6 il 1.1	Silver Lake House, Pyramid Peak, Eldorado Co., Cal.	G. Steiger.	W. Lindgren, A. J. S., III, p. 306, 1897.	Granodiorite.	

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp.gr.
9	70.75	15.13	0.98	1.43	0.73	3.09	3.05	3.62	0.51	0.10	none	0.42	0.10	trace	0.12	100.13	
A1. I	1.179	.148	.006	.019	.017	.055	.049	.038				.005	.001	—	.001		
10	64.48	16.50	3.47	n. d.	1.60	4.42	3.13	3.72	2.94							100.26	
A4. IV	1.075	.162	.022	(.044)	.040	.078	.050	.039									
11	68.26	14.35	1.30	2.34	1.13	2.85	2.45	3.64	3.17					0.70		100.19	
A3. III	1.138	.141	.008	.032	.018	.051	.040	.038						.010			
12	65.69	16.41	0.73	2.74	1.42	3.36	2.39	5.24	1.20			0.44	trace	trace		100.83	2.581
A1. I	1.095	.161	.005	.038	.036	.060	.039	.056				.006	—	—			15°
13	65.53	16.89	1.00	2.38	1.17	3.24	2.71	4.59	1.98			0.46	trace	trace		100.85	2.540
A1. I	1.092	.166	.006	.033	.029	.058	.044	.049				.006	—	—			15°
14	65.79	16.58	5.18	n. d.	0.98	3.05	2.34	4.63	1.83							100.37	
A4. IV	1.097	.162	.032	(.064)	.025	.054	.037	.049									
15	63.71	17.28	2.41	1.16	2.93	5.16	2.60	4.22	0.96				trace			100.43	2.707
A3. III	1.062	.169	.015	.016	.073	.092	.042	.045					—				15°
16	63.17	17.15	2.84	1.31	2.17	4.17	3.08	4.19	2.51							100.59	2.525
A3. III	1.053	.168	.018	.018	.054	.074	.050	.045									17°
17	61.93	18.47	1.93	2.23	2.66	4.31	2.92	3.92	2.28							100.65	2.601
A3. III	1.031	.181	.012	.031	.067	.077	.047	.042									18°
18	67.85	18.39	1.27	n. d.	0.60	4.82	2.38	3.42	2.23							100.96	
B3. IV	1.131	.180	.008	(.016)	.015	.086	.039	.036									
19	67.62	15.93	4.37	n. d.	1.33	4.44	3.18	2.87	0.99							100.73	
A4. IV	1.127	.156	.027	(.051)	.033	.079	.051	.031									
20	66.55	15.61	2.42	n. d.	0.51	3.49	2.89	4.29	4.81							100.57	
A4. IV	1.109	.153	.015	(.030)	0.13	.062	.047	.046									
21	66.27	18.66	1.99	n. d.	0.66	4.89	3.65	3.39	0.70							100.21	
A3. III	1.105	.183	.013	(.026)	.017	.087	.059	.036									

RANG 3. ALKALICALCIC. COLORADASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp.gr.
1	67.74	16.13	1.50	1.96	1.36	4.41	4.92	1.30	0.86	0.10				trace		100.28	
A3. III	1.129	.158	.009	.028	.034	.078	.079	.014						—			
2	67.33	16.20	1.40	2.73	1.31	2.81	3.15	2.14	1.84			0.80	0.16	trace	0.05	99.92	
A2. II	1.122	.159	.009	.008	.033	.050	.051	.023				.010	.001	—	—		
3	62.91	19.13	0.98	3.20	1.69	4.28	3.94	3.38	0.63							100.14	
A3. III	1.049	.187	.006	.044	.042	.077	.063	.035									

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASIC. AMIATOSE—Continued.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
FeS$_2$ 0.06 NiO none SrO 0.04 Li$_2$O trace	Q 31.3 or 21.1 ab 25.7 an 15.3 C 0.6	hy 2.7 mt 1.4 il 0.8	North Fork of Tuolumne River, Amador County, Cal.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 702, 1896.	Biotite-granite.	
	Q 18.4 or 21.7 ab 26.2 an 20.3	di 1.2 hy 9.2	N. S. de Guadelupe, n. Mexico, Mexico.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 458, 1887.	Andesite.	
	Q 31.6 or 21.1 ab 21.0 an 14.2 C 1.2	hy 5.3 mt 1.9	Skrutten, Helsingland, Sweden.	H. Santesson.	F. Svenonius, G. F. F., X, p. 273, 1888.	Andesite breccia.	
X 0.77 SO$_3$ 0.17 Cl 0.03 Li$_2$O 0.24	Q 20.5 or 31.1 ab 20.4 an 16.7 C 0.6	hy 7.2 mt 1.2 il 0.9	Nocchetto, Mount Amiata, Tuscany.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 408, 1887.	Trachyte.	SO$_3$ for S.?
X 0.61 SO$_3$ 0.20 Cl 0.09 Li$_2$O trace	Q 22.0 or 27.2 ab 23.1 an 16.1 C 1.5	hy 5.9 mt 1.4 il 0.9	Casa la Fornacina, Mount Amiata, Tuscany.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 410, 1887.	Trachyte.	SO$_3$ for S.?
	Q 23.0 or 27.2 ab 19.4 an 15.1 C 2.2	hy 10.9	Mount Amiata, Tuscany.	L. Ricciardi.	L. Ricciardi, Gazz. Chem. Ital., XVIII, 1888.	Trachyte.	
	Q 17.6 or 25.0 ab 22.0 an 22.2	di 2.6 hy 6.2 mt 3.5	Near Adami Mine, Laurion, Greece.	R. Lepsius.	R. Lepsius, G. von Attika, Berlin, 1893, p. 90.	Granite.	Near hartzose.
	Q 17.0 or 25.0 ab 26.2 an 20.3	hy 5.4 mt 4.2	SE. slope of Acropolis, Pergamon, Asia Minor.	H. S. Washington.	H. S. Washington, A. J. S., III, p. 49, 1897.	Biotite-dacite.	Dried at 110°.
	Q 15.4 or 23.4 ab 24.6 an 21.4 C 1.5	hy 9.3 mt 2.8	Kara Tash, Smyrna, Asia Minor.	H. S. Washington.	H. S. Washington, A. J. S., III, p. 45, 1897.	Augite-andesite.	Dried at 110°.
	Q 28.7 or 20.0 ab 20.4 an 23.9 C 1.9	hy 3.7	Cap Blanc, n. Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Genev., XXXIII, p. 59, 1900.	Hypersthene-dacite.	
	Q 23.7 or 17.2 ab 26.7 an 20.6	di 1.3 hy 9.7	Dra zeg Etter, n. Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Genev., XXXIII, p. 129, 1900.	Dacite.	
	Q 23.2 or 25.6 ab 24.6 an 16.7	di 0.4 hy 5.0	Cap Blanc, n. Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Genev., XXXIII, p. 59, 1900.	Dacite.	Not fresh.
	Q 19.1 or 20.0 ab 30.9 an 24.2	hy 5.2	Cap Blanc, n. Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Genev., XXXIII, p. 59, 1900.	Dacite.	

SUBRANG 4. DOSODIC. YELLOWSTONOSE.

	Q 21.9 or 7.8 ab 41.4 an 20.9	di 0.8 hy 5.6 mt 2.1	Opimika Narrows, Lake Temiscaming, Quebec.	F. G. Wait.	G. C. Hoffmann, A. R. G. S. Can., IX, p. 19 R., 1898.	Granitite.	
	Q 31.6 or 12.8 ab 26.7 an 13.9 C 3.6	hy 5.8 mt 2.1 il 1.5	Near East Clarendon, Vermont.	H. N. Stokes.	B. U. S. G. S., 148, p. 71, 1897.	Granite.	Not described.
	Q 13.6 or 19.5 ab 33.0 an 21.4 C 1.2	hy 9.2 mt 1.4	Dorsey's Run, Howard County, Maryland.	W. F. Hillebrand.	C. R. Keyes, 15 A. R. U. S. G. S., p. 722, 1895.	Biotite-granite.	

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
4	65.23	16.94	1.60	1.91	1.31	3.85	3.57	3.02	0.88	0.18	0.25	0.66	0.19	trace	0.19	99.78	
A1. I	1.087	.166	.010	.027	.033	.069	.058	.032				.008	.001	—	.001		
5	67.54	17.02	2.97	0.34	0.13	3.36	4.62	2.28	0.55			0.80	trace	trace		100.05	
A2. II	1.126	.167	.019	.005	.003	.060	.075	.024				.010	—	—			
6	66.05	16.96	2.59	1.38	2.08	3.37	4.20	2.53	0.69			0.34	trace	none		100.22	
A2. II	1.101	.166	.016	.019	.052	.060	.068	.027				.004	—	—			
7	65.97	16.53	2.59	1.72	2.11	3.37	3.41	2.67	1.23			0.42	trace	none		100.33	
A2. II	1.100	.162	.016	.024	.053	.060	.055	.028				.005	—	—			
8	65.60	17.61	0.95	2.76	1.49	3.72	4.36	2.36	0.59			0.75	0.16	none		100.38	
A2. II	1.093	.173	.006	.038	.038	.066	.070	.025				.009	.001	—			
9	64.85	16.57	2.10	2.15	2.14	4.01	3.71	3.10	0.35			0.91	0.14	none		100.03	
A2. II	1.081	.162	.013	.030	.054	.072	.060	.033				.011	.001	—			
10	65.66	15.61	2.10	2.07	2.46	3.64	3.65	2.03	1.07			1.37	trace	none		100.27	
A2. II	1.094	.153	.013	.029	.062	.065	.059	.022				.017	—	—			
11	64.27	17.84	3.36	1.29	2.00	3.42	3.84	2.48	1.32			0.32	0.16	none		100.33	
A2. II	1.071	.175	.021	.018	.050	.061	.062	.026				.004	.001	—			
12	65.63	17.00	2.55	1.19	2.03	3.48	4.42	1.64	2.00		0.27	trace	0.07	none		100.32	
A2. II	1.094	.167	.016	.017	.051	.062	.071	.018				—	.001	—			
13	64.61	18.62	2.78	0.95	0.85	4.20	4.37	2.36	0.93		0.25	none	0.30	trace		100.23	
A2. II	1.077	.182	.017	.014	.021	.075	.071	.025				—	.002	—			
14	64.23	16.34	1.07	1.58	2.47	3.07	3.49	2.59	1.76	0.47	0.30	0.50	0.18	trace	0.19	99.91	
A1. 1	1.071	.160	.007	.022	.062	.055	.056	.027				.006	.001	—	.001		
15	63.76	16.01	2.22	1.96	2.43	4.55	3.98	2.84	0.57	0.28	0.23	0.52	0.25	0.09	0.17	99.95	
A1. I	1.063	.157	.014	.028	.061	.081	.064	.030				.006	.002	.001	.001		
16	63.42	17.16	3.09	1.50	1.64	4.65	4.51	3.04	0.28	0.16		0.35	0.26	0.04		100.29	
A2. II	1.057	.169	.019	.021	.041	.083	.073	.032				.004	.002	—			
17	61.50	17.42	4.66	1.09	1.26	5.33	3.99	1.29	2.44			none	0.60	trace		99.96	
A2. II	1.015	.170	.029	.015	.032	.094	.064	.014				—	.004	—			
18	68.10	14.97	2.78	1.10	1.10	3.04	3.46	2.93	1.28		0.92	0.07	0.16	0.09	none	100.11	2.736
A1. I	1.135	.147	.017	.015	.015	.054	.056	.031				.001	.001	.001	—		16°
19	67.01	18.03	0.66	0.72	0.84	3.99	4.42	3.53	0.91				0.10	0.09	0.10	100.40	
A2. II	1.117	.175	.004	.010	.021	.071	.071	.037					.001	.001	.001		
20	63.66	17.05	1.97	2.62	1.99	3.89	4.13	3.09	1.19				0.27	0.14		100.08	
A2. II	1.061	.167	.013	.036	.050	.070	.066	.033					.002	.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. YELLOWSTONOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 S	none none	Q 22.0 or 17.8 ab 30.4 an 19.2 C 0.7	hy 4.5 mt 2.3 il 1.2	Silver Wreath Tunnel, Willow Creek Dist., Boise Co., Idaho.	G. Steiger.	W. Lindgren, 18 A. R. U. S. G. S., III, p. 640, 1898.	Biotite-granite.	
SO_3 Cl Li_2O	0.26 0.15 0.03	Q 24.5 or 13.3 ab 39.3 an 16.7 C 0.8	hy 0.8 il 1.2 hm 3.0	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 627, 1891.	Quartz-mica-diorite.	SO_3 for S. Near lassenose.
SO_3 Cl Li_2O	0.03 trace none	Q 21.5 or 15.0 ab 35.6 an 16.7 C 1.1	hy 5.2 mt 3.7 il 0.5	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 627, 1891.	Quartz-mica-diorite.	SO_3 for S.
SO_3 Cl Li_2O	0.13 0.09 0.09	Q 25.6 or 15.6 ab 28.8 an 16.7 C 1.9	hy 5.7 mt 3.7 il 0.8	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 627, 1891.	Quartz-mica-diorite-porphyrite.	SO_3 for S.
SO_3 Cl Li_2O	trace none 0.03	Q 19.8 or 13.9 ab 36.7 an 18.3 C 1.2	hy 6.9 mt 1.4 il 1.4	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 627, 1891.	Quartz-mica-diorite.	
SO_3 Cl Li_2O	trace none none	Q 19.3 or 18.3 ab 31.4 an 19.2	di 0.8 hy 5.9 mt 3.0 il 1.7	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 627, 1891.	Quartz-mica-diorite.	
SO_3 Cl Li_2O	0.13 0.12 0.36	Q 25.0 or 12.2 ab 30.9 an 18.1 C 0.7	hy 6.2 mt 2.8 il 2.6	Sepulchre Mountain, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 648, 1891.	Dacite.	
SO_3 Cl Li_2O	trace none 0.03	Q 22.3 or 14.5 ab 32.5 an 17.0 C 2.7	hy 5.0 mt 4.2 il 0.6	Sepulchre Mountain, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 648, 1891.	Hornblende-mica-andesite.	
SO_3 Cl Li_2O	trace trace 0.04	Q 23.1 or 10.0 ab 37.2 an 17.2 C 1.6	hy 5.1 mt 3.8	Fan Creek, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 81, 1899.	Hornblende-mica-andesite-porphyry.	
SO_3 Cl Li_2O	trace trace 0.01	Q 19.8 or 13.9 ab 37.2 an 20.9 C 1.1	hy 2.1 mt 3.2 hm 0.6	Crescent Hill, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 272, 1899.	Hornblende-mica-andesite.	
FeS_2 NiO SrO Li_2O	1.61 none 0.06 trace	Q 23.5 or 15.0 ab 29.3 an 15.3 C 2.2	hy 7.5 mt 1.6 il 0.9 pr 1.6	Crater Mountain, Yellowstone National Park.	H. N. Stokes.	Hague and Jaggar, B. U. S. G. S., 168, p. 96, 1900.	Granite-porphyry.	
Cl NiO SrO Li_2O	trace none 0.09 trace	Q 16.6 or 16.7 ab 33.5 an 20.3	di 1.8 hy 6.2 mt 3.2 il 0.9	Needle Mountain, Yellowstone National Park.	H. N. Stokes.	Hague and Jaggar, B. U. S. G. S. 168, p. 96, 1900.	Diorite.	Near tonalose.
NiO	0.19	Q 14.2 or 17.8 ab 38.3 an 17.8	di 4.2 hy 2.4 mt 3.9 il 0.6 hm 0.3	Hurricane Ridge, Crandall Basin, Yell. Natl. Park.	W. H. Melville.	J. P. Iddings, M. U. S. G. S., XXXII, p. 261, 1899.	Quartz-diorite-porphyrite.	
SO_3 Li_2O	0.35 0.03	Q 21.8 or 7.8 ab 33.5 an 22.5 C 1.1	hy 3.2 mt 3.5 hm 2.2 ap 1.4	Indian Creek Laccolith, Yellowstone National Park.	W. H. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 61, 1899.	Hornblende-mica-porphyrite.	SO_3 for S.
Cl SrO	0.03 0.08	Q 28.7 or 17.2 ab 29.3 an 15.0 C 0.6	hy 2.7 mt 3.9	Johnson Gulch, Leadville, Colorado.	W. F. Hillebrand.	W. Cross, M. U. S. G. S., XII, p. 332, 1886.	Porphyry	
		Q 18.2 or 20.6 ab 37.2 an 18.6	di 0.9 hy 2.5 mt 0.9	Copper Mountain, Leadville, Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S., 148, p. 176, 1897.	Diorite-porphyry.	
SrO Li_2O	0.08 none	Q 15.5 or 17.3 ab 34.6 an 18.9	hy 8.1 mt 3.0 ap 0.6	Gold Hill, Ten Mile District, Colorado.	W. F. Hillebrand.	W. Cross, 14 A. R. U. S. G. S., II, p. 227, 1894.	Quartz-hornblende-mica-porphyrite.	

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
21	62.85	16.21	3.08	1.46	1.47	4.72	3.49	3.10	2.03	0.29		0.41	0.48	0.15	0.11	99.85	
A1. I	1.048	.159	.020	.020	.037	.084	0.56	.033				.005	.003	.002	.001		
22	61.42	17.69	4.24	1.74	1.81	5.29	3.14	3.19	0.97			0.37	0.14	0.19	0.09	100.28	
A1. I	1.024	.174	.027	.025	.045	.094	.050	.034				.005	.001	.003	.001		
23	59.29	21.27	3.33	1.04	1.12	5.25	3.39	3.00	1.63				0.23	0.21		99.76	2.596
A2. II	.988	.208	.020	.014	.028	.094	.055	.032					.002	.003			14.5°
24	63.30	17.81	3.42	0.83	2.07	5.12	4.27	2.26	0.88							99.96	
A3. III	1.055	.174	.021	.011	.052	.091	0.69	.024									
25	68.12	16.24	1.26	2.08	1.35	3.80	3.89	2.54	0.40			0.25	0.14	0.10	0.09	100.28	
A1. I	1.135	.159	.008	.030	.034	.068	.063	.027				.003	.001	.001	.001		
26	68.10	15.18	1.34	1.70	2.06	4.66	3.71	1.48	0.55			0.35	0.18	0.20	0.06	99.57	
A2. II	1.135	.149	.008	.024	.052	.083	.059	.016				.004	.001	.003	—		
27	64.48	19.28	1.40	1.78	1.64	5.06	4.41	1.12	0.06							99.23	
B3. IV	1.075	.189	.009	.025	.041	.090	.071	.012									
28	64.52	18.31	0.90	2.51	2.35	5.11	4.64	1.25	0.20							99.79	
A3. III	1.075	.179	.006	.035	.059	.091	.075	.014									
29	64.24	18.67	1.40	1.96	1.48	4.11	4.14	1.71	1.18			0.76	0.08	trace		100.20 .05	
A2. II	1.071	.183	.009	.028	.037	.073	.067	.018				.009	.001	—		100.15	
30	63.81	17.07	2.11	2.15	2.28	4.97	4.08	1.96	1.03	—		0.38	0.10	0.09	0.04	100.10	
A1. I	1.064	.167	.013	.030	.047	.089	.066	.021				.005	.001	.001	—		
31	67.33	15.93	1.90	1.59	1.63	4.09	3.76	2.46	0.66	0.19		0.36	0.11	0.09	0.08	100.18	
A1. 1	1.122	.156	.012	.022	.041	.073	.060	.025				.005	.001	.001	.001		
32	66.94	16.49	1.41	1.87	1.98	4.77	3.88	1.65	0.22	0.35		0.30	0.12	0.13	0.07	100.23	
A1. I	1.116	.161	.009	.027	.050	.086	.063	.018				.004	.001	.002	—		
33	66.65	17.61	0.93	1.67	1.26	4.44	4.59	1.70	0.41	0.03		0.33	0.18	0.07	0.12	99.99	
A1. I	1.111	.172	.006	.024	.032	.079	.074	.018				.004	.001	.001	.001		
34	66.65	16.15	1.52	2.36	1.74	4.53	3.40	2.65	0.72	0.18		0.38	0.10	0.10	0.07	100.57	
A1. I	1.111	.158	.009	.033	.044	.080	.053	.029				.005	.001	.001	—		
35	65.43	17.11	2.39	1.19	1.48	3.88	3.66	2.83	0.36	0.20		0.83	trace	0.70		100.26	
A2. II	1.091	.168	.015	.017	.037	.070	.059	.030				.010	—	.010			
36	71.63	13.86	0.46	2.76	trace	3.26	3.40	2.65	0.89			trace	0.20			99.11	2.68
B2. III	1.194	.136	.003	.038	—	.058	.055	.028				—	.001				
37	66.02	17.06	2.14	3.01	1.97	4.64	3.98	1.44	0.36			0.05				100.67	2.544
A3. III	1.100	.167	.013	.042	.049	.083	.064	.016				.001					
38	65.10	16.16	3.28	0.90	1.82	4.30	3.35	2.40	2.58			n. d.	0.30			100.19	2.574
A3. III	1.085	.158	.020	.012	.046	.077	.054	.025				—	.002				

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. YELLOWSTONOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 20.1 or 18.3 ab 29.3 an 19.5	di 0.5 hy 3.4 mt 3.5 il 0.8 hm 0.8	Mount Marcellina, West Elk Mountains, Colorado.	T. M. Chatard.	W. Cross, 14 A. R. U. S. G. S., II, p. 227, 1894.	Diorite-porphyrite.	
		Q 17.5 or 18.9 ab 26.2 an 25.0	di 1.0 hy 4.1 mt 4.6 il 0.8 hm 1.1	Storm Ridge, West Elk Mountains, Colorado.	L. G. Eakins.	W. Cross, 14 A. R. U. S. G. S., II, p. 227, 1894.	Porphyrite.	Near tonalose.
		Q 15.0 or 17.8 ab 28.8 an 26.1 C 2.8	hy 2.8 mt 3.2 hm 1.0	Table Mountain, Denver, Colorado.	L. G. Eakins.	W. Cross, Proc. Colo. Sc. Soc., I, p. 72, 1886.	Augite-andesite.	Pebble. Al_2O_3 high?
		Q 16.4 or 13.3 ab 36.2 an 22.5	di 2.2 hy 4.2 mt 2.6 hm 1.6	Mount Rose, Washoe, Nevada.	R. W. Woodward.	G. F. Becker, M. U. S. G. S., III, p. 152, 1882.	Hornblende-mica-andesite.	Also in Hague and Iddings, B. U. S. G. S., 17, p. 33, 1885.
Cr_2O_3 SrO Li_2O	none 0.02 trace	Q 25.6 or 14.0 ab 33.0 an 18.9	hy 6.0 mt 1.9 il 0.5	Crater Peak, Shasta County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S. I, p. 731, 1896.	Hypersthene-andesite.	Also in J. G., III, p. 407, 1895.
		Q 27.8 or 8.9 ab 30.9 an 20.6	di 2.2 hy 5.8 mt 1.9 il 0.6	Ono, Shasta County, California.	T. M. Chatard.	B. U. S. G. S. 148 p. 191, 1897.	Diorite.	Not described.
		Q 20.4 or 6.7 ab 37.2 an 25.0 C 1.6	hy 6.2 mt 2.1	Black Butte, Mount Shasta, California.	W. H. Melville.	J. S. Diller, B. U. S. G. S. 150, p. 223, 1898.	Hornblende-andesite.	Near amadorose.
		Q 16.3 or 7.8 ab 39.3 an 25.3	hy 9.8 mt 1.4	West base Mount Shasta, California.	W. H. Melville.	J. S. Diller, B. U. S. G. S. 150, p. 228, 1898.	Hypersthene-andesite.	Near amadorose.
SO_3 Cl	0.22 0.25	Q 22.1 or 10.0 ab 35.1 an 20.3 C 2.6	hy 5.0 mt 2.1 il 1.4	Clear Creek, Shasta County, California.	J. E. Whitfield.	J. P. Iddings, B. U. S. G. S. 150, p. 236, 1898.	Dacite-porphyry.	SO_3 for S. Cl high?
SrO Li_2O	0.03 trace	Q 18.7 or 11.7 ab 34.6 an 22.2	di 2.0 hy 6.2 mt 3.0 il 0.8	Head of Mill Creek, Shasta County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S. 148, p. 194, 1897.	Dacite?	Dried at 110°. Near tonalose.
SrO Li_2O	trace trace	Q 25.3 or 13.9 ab 31.4 an 19.7	di 0.5 hy 4.5 mt 2.8 il 0.8	Mount Ingalls, Plumas County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 724, 1896.	Granodiorite.	Also in J. G., III, p. 403, 1895.
SrO Li_2O	0.05 trace	Q 24.0 or 10.0 ab 33.0 an 22.2	di 1.5 hy 6.1 mt 2.1 il 0.6	Near Goodyear's Bar, Sierra County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 731, 1896.	Hypersthene-andesite.	Also in J. G., III, p. 407, 1895.
SrO Li_2O	trace trace	Q 21.3 or 10.0 ab 38.8 an 22.0	hy 4.9 mt 1.4 il 0.6	Indian Valley, Sierra County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 724, 1896.	Quartz-diorite-porphyry.	Also in J. G., III, p. 403, 1895.
FeS_2 SrO Li_2O	0.02 trace trace	Q 24.0 or 16.1 ab 27.8 an 21.1	di 1.0 hy 6.4 mt 2.1 il 0.8	Near Nevada City, Nevada County, California.	W. F. Hillebrand.	W. Lindgren, 17 A. R. U. S. G. S., II, p. 38, 1896.	Granodiorite.	
NiO	0.20	Q 22.8 or 16.7 ab 30.9 an 19.5 C 0.9	hy 3.7 mt 1.6 il 1.5 hm 1.3	Clear Lake, California.	W. H. Melville.	G. F. Becker, M. U. S. G. S., XIII, p. 154, 1888.	Andesite.	
		Q 33.3 or 15.6 ab 28.8 an 14.7	hy 4.6 mt 0.7 ap 0.4	Carmelo Bay, California.	J. Posada.	A. C. Lawson, B. G. Dep. Un. Cal., I, p. 16, 1893.	Granite.	
		Q 22.6 or 8.9 ab 33.5 an 28.1	hy 8.8 mt 3.0	Cerro de Tlapacoya, Lake Chalco, Mexico.	A. Röhrig.	H. Lenk, Btr. G. Mex., II, p. 233, 1899.	Hornblende-andesite.	
		Q 24.7 or 13.9 ab 28.3 an 21.4 C 0.2	hy 4.6 mt 2.8 hm 1.8	Ferreria San Esteban, Oaxaca, Mexico.	A. Röhrig.	H. Lenk, Btr. G. Mex., II, p. 132, 1899.	Trachyte.	

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
39	65.03	18.83	2.35	n. d.	2.06	4.43	4.38	2.24	1.00							100.32	2.589
A4. IV	1.084	.185	.015	(.030)	.052	.078	.071	.023									
40	69.90	14.16	2.98	1.08	1.38	4.30	3.20	1.95	1.08			0.83	trace			100.86	
B2. III	1.165	.139	.019	.015	.035	.077	.051	.021				.010	—				
41	68.20	15.83	2.86	0.51	2.14	3.49	3.07	2.88	0.50	—	0.06	0.46	0.01	0.08		100.10	
A1. I	1.137	.155	.018	.007	.054	.062	.050	.030				.006	—	.001			
42	67.40	19.06	0.71	1.31	1.90	4.30	3.16	1.52	0.30	—	0.32	0.34	0.02	0.06		100.40	
A2. II	1.123	.187	.004	.018	.048	.077	.051	.016				.004	—	.001			
43	65.88	15.61	2.42	2.71	1.76	3.70	3.92	2.29	1.05	—	trace	0.43	0.13	0.08	none	100.00	
A1. I	1.098	.153	.015	.038	.044	.066	.063	.024				.005	.001	.001			
44	62.95	20.81	1.73	0.39	2.66	3.75	4.15	3.46	0.20	—	0.02	trace	0.09	none		100.22	
A2. II	1.049	.204	.011	.005	.067	.067	.067	.037				—	.001	—			
45	68.41	16.08	2.12	1.44	1.14	3.52	4.52	2.24	0.33							99.84	
A3. III	1.140	.157	.013	.020	.029	.062	.072	.023									
46	67.30	17.55	1.47	1.67	1.04	3.48	3.90	2.13	0.80				.013			99.47	
A3. III	1.122	.172	.009	.024	.026	.062	.063	.022					.001				
47	63.19	18.65	4.01	1.89	1.20	4.86	3.69	1.95	0.07			0.18	0.25	0.13		100.07	
A2. II	1.053	.182	.025	.027	.030	.088	.059	.021				.002	.002	.002			
48	63.18	19.79	1.10	3.23	1.51	4.04	5.12	2.42	0.62							101.01	
B3. IV	1.053	.194	.007	.044	.035	.072	.082	.026									
49	70.33	15.59	3.05	n. d.	1.30	3.05	4.50	1.29	n. d.			1.09				100.20	
A3. III	1.172	.153	.020	(.040)	.033	.055	.072	.014				.013					
50	61.93	18.83	3.24	1.24	2.37	4.46	4.16	2.72	1.83							100.78	2.62
A3. III	1.032	.184	.020	.017	.059	.080	.068	.028									
51	59.44	18.97	5.25	1.72	0.85	6.85	3.08	2.46	1.22							99.84	2.65
A3. III	.991	.186	.033	.024	.021	.122	.050	.026									
52	63.62	17.72	3.24	3.40	1.49	4.83	2.29	1.99	1.09							99.67	
A3. III	1.060	.174	.020	.048	.037	.086	.037	.021									
53	67.34	15.96	3.38	0.80	0.88	2.98	4.12	1.66	2.20			0.56				99.78	2.462
A3. III	1.122	.156	.021	.011	.022	.053	.066	.018				.007					
54	64.83	17.60	4.95	1.82	1.61	5.26	2.52	1.53	0.20			0.08				100.40	2.539
A3. III	1.081	.172	.031	.025	.040	.094	.041	.017				.001					
55	62.90	18.29	1.79	4.00	1.61	5.62	2.91	1.48	0.98			0.18				99.77	2.464
A3. III	1.048	.179	.012	.056	.040	.100	.047	.016				.002					

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. YELLOWSTONOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 16.9 or 12.8 ab 37.2 an 21.7 C 1.3	hy 9.1	Nevado de Toluca, Mexico.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 458, 1887.	Andesite.	
		Q 33.2 or 11.7 ab 26.7 an 18.6	di 2.2 hy 2.5 mt 1.2 il 1.5 hm 2.2	Serro Colorado, Aruba Island, West Indies.	Perlstein.	J. H. Kloos, Samml. G. R. Mus., Leiden, I, p. 19, 1887.	Quartz-diorite.	
FeS_2	0.01	Q 28.7 or 16.7 ab 26.2 an 17.2 C 1.3	hy 5.4 mt 0.5 il 0.8 hm 2.5	Average Sample, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Esseq. R., p. 42, 1900.	Hornblende-granite.	Dried at 100°. Near amiatose. Alk. corr. Priv. contrib. J. B. H.
FeS_2 CuS	trace trace	Q 30.5 or 8.9 ab 26.7 an 21.4 C 4.4	hy 6.1 mt 0.9 il 0.6	Average Sample, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Esseq. R., p. 34, 1900.	Granitite-gneiss.	Dried at 100°.
ZrO_2 Cl FeS_2 CoO CuO	trace 0.02 trace none trace	Q 22.9 or 13.3 ab 33.0 an 18.3	hy 6.8 mt 3.5 il 0.8	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Private contribution.	Granitite.	Dried at 100°.
		Q 13.4 or 20.6 ab 35.1 an 18.6 C 3.4	hy 6.7 mt 1.2 hm 1.0	Sericambra, Demerara, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Esseq. R., p. 44, 1900.	Syenite.	Dried at 100°. Alk. corr. Priv. contrib. J. B. H.
		Q 24.6 or 12.8 ab 37.7 an 17.4	hy 3.8 mt 3.0	Paramo, Azufral de Tuquerres, Colombia.	R. Küch.	R. Küch, G. Stud. Colomb., I, p. 155, 1892.	Biotite-hornblende-dacite.	
		Q 26.8 or 12.2 ab 33.0 an 17.2 C 2.6	hy 4.6 mt 2.1	Paramo, Azufral de Tuquerres, Colombia.	R. Küch.	R. Küch, G. Stud. Colomb., I, p. 155, 1892.	Biotite-hornblende-dacite.	
		Q 22.0 or 11.7 ab 30.9 an 24.5 C 1.4	hy 3.0 mt 5.8 il 0.3	Mte. Tajumbina, Peru.	C. Hoepfner.	C. Hoepfner, In. Diss. Halle, p. 32, 1881.	Dacite.	
		Q 11.3 or 13.5 ab 43.0 an 20.0 C 1.4	hy 8.5 mt 1.6	Gualilan, San Juan Province, Argentina.	B. Wetzig.	A. Stelzner, Btr. G. Arg. Rep., I, p. 186, 1885.	Dacite.	Sum high.
		Q 29.2 or 7.8 ab 37.7 an 15.3 C 1.2	hy 6.8 il 2.0	Farsund, n. Lister, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, p. 113.	Hypersthene-adamellite.	
		Q 14.2 or 15.6 ab 35.6 an 22.2 C 0.8	hy 5.9 mt 4.5	Kesselsdorf, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII, p. 750, 1886.	Feldspar-porphyrite.	
		Q 16.9 or 14.5 ab 26.2 an 30.6	di 2.6 hy 0.9 mt 7.0	Kaufbach, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII, p. 754, 1886.	Augite-porphyrite.	
		Q 28.5 or 11.7 ab 19.4 an 23.9 C 3.1	hy 7.3 mt 4.6	Mte. Colmo, Adamello, Tyrol.	C. Riva.	C. Riva, cf. N. J., 1897, II, p. 65.	Quartz-mica-porphyrite.	
		Q 29.4 or 10.0 ab 34.6 an 14.7 C 1.9	hy 2.0 mt 0.9 il 1.1 hm 2.7	Kolantziki, Megara, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Biotite-dacite.	
		Q 30.3 or 9.5 ab 21.5 an 26.1 C 2.0	hy 4.0 mt 6.8	Panagia, Methana, Greece.	A. Röhrig.	H. S. Washingtor J. G., III, p. 150, 1895.	Hornblende-hypersthene-dacite.	Near kadiakose.
Cl	0.01	Q 23.2 or 8.9 ab 24.6 an 27.8 C 1.6	hy 9.8 mt 2.0	Kosona, Methana, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende-hypersthene-dacite.	Near kadiakose.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
56	59.93	16.99	3.58	1.28	1.51	5.92	3.23	1.55	4.28			0.96				99.23	2.327
B3. IV	.992	.166	.022	.018	.037	.106	.052	.017				.012					
57	66.18	18.71	1.49	2.00	0.87	3.28	3.63	2.84	0.72							99.72	
A3. III?	1.103	.183	.009	.028	.022	.059	.058	.030								(98.29)	
58	68.51	15.96	2.61	1.09	1.07	3.14	4.01	1.82	n.d.			0.82		0.28		100.65	2.329
A2. II	1.142	.156	.016	.015	.027	.056	.064	.020				.010		.004			
59	67.56	16.39	1.25	1.86	1.48	5.08	3.54	1.77	n.d.	0.17				0.79		99.89	2.678
A3. III	1.126	.160	.008	.026	.037	.091	.057	.020						.011			21°

RANG 3. ALKALICALCIC. COLORADASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	69.66	17.57	0.21	1.04	0.58	4.54	4.91	0.71	0.50	0.05	none	0.21	0.03	trace	0.03	100.09	
A1. I	1.161	.172	.001	.014	.015	.081	.079	.007				.003	—	—	—		
2	70.96	16.64	0.22	1.48	1.29	3.46	4.59	0.24	0.68	—	0.42	0.38	0.01	0.10		100.47	2.737
A2. II	1.178	.163	.001	.021	.032	.061	.074	.002				.005	—	.001			
3	69.34	17.25	2.46	n.d.	1.18	3.43	4.33	0.71	1.17							99.87	
A4. IV	1.156	.169	.015	(.030)	.030	.060	.069	.007									
4	66.97	17.20	3.27	1.26	2.08	3.94	5.48	0.69	0.11							101.00	2.76
B3. IV	1.116	.169	.020	.018	.052	.070	.098	.007									

RANG 4. DOCALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	63.77	19.13	1.66	1.15	4.29	5.63	2.20	0.99	0.60	—	0.14	0.17	0.02	0.20		99.95	
A2. II	1.063	.187	.010	.017	.107	.101	.035	.010				.002	—	.003			
2	63.09	18.89	3.48	2.02	1.97	6.18	3.14	1.30	0.63							100.70	
A3. III	1.052	.185	.022	.028	.049	.110	.051	.015									

CLASS I. PERSALANE.

RANG 1. PERALKALIC. NORDMARKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	65.43	16.11	1.15	2.85	0.40	1.49	5.00	5.97	0.39	0.19	trace?	0.50	0.13	0.23	0.03	100.18	
A1. I	1.091	.168	.009	.039	.010	.027	.081	.064				.006	.001	.003	—		
2	64.88	16.24	1.37	2.70	0.89	1.92	5.00	5.61	0.46	0.19	none	0.69	0.13	0.14	0.06	100.53	
A1. I	1.081	.159	.008	.038	.022	.034	.081	.060				.008	.001	.002	—		
3	63.71	18.30	2.08	2.52	0.09	1.18	6.39	6.21	0.17	0.09		trace		trace		100.74	
A3. III	1.062	.180	.013	.035	.002	.021	.103	.065				—		—			
4	61.05	18.81	2.02	3.06	0.42	1.30	6.56	6.02	0.78			0.34		trace	none	100.04	2.655
A2. II	1.018	.183	.013	.043	.011	.023	.106	.064				.004		—	—		12°

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. YELLOWSTONOSE—Continued.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl 0.01	Q 20.3 or 9.5 ab 27.2 an 27.0	di 2.0 hy 2.8 mt 1.4 il 1.7 hm 2.5	Spasmeno Vouno, Aegina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende-andesite.	Not fresh.
	Q 25.0 or 16.7 ab 30.4 an 16.4 C 3.7	hy 4.8 mt 2.1	Kalko, n. Blo, Caucasus Mountains.	Makerow.	Loewinson-Lessing, cf. N. J., 1899, II, p. 237.	Dacite.	Sum incorrectly given.
Sol. salts 1.34	Q 29.9 or 11.1 ab 33.5 an 15.6 C 1.6	hy 2.7 mt 1.2 il 1.5 hm 1.7	Eruption of 1883, Krakatoa.	C. Winkler.	R. D. M. Verbeek, Krakatau, p. 292, 1884.	Andesite-pumice.	
	Q 26.1 or 11.1 ab 29.9 an 23.1	di 1.9 hy 5.2 mt 1.9	Moruya, New South Wales.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XVI, p. 42, 1883.	Granite.	

SUBRANG 5. PERSODIC. AMADOROSE.

FeS_2 trace? NiO none SrO 0.05 Li_2O none	Q 27.3 or 3.9 ab 41.4 an 22.5 C 0.5	hy 3.3 mt 0.2 il 0.5	Tuolumne River, Amador County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, 702, 1896.	Quartz-diorite-aplite.	
S trace	Q 32.6 or 1.1 ab 38.8 an 17.0 C 2.6	hy 5.2 mt 0.2 il 0.8	Average sample, Potaro River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Esseq. River, p. 52, 1900.	Porphyrite.	Dried at 110°.
	Q 31.2 or 3.9 ab 36.2 an 16.7 C 6.4	hy 5.2	Saganaga Lake, Minnesota.	A. D. Meeds.	U. S. Grant, 21 A. R. G. Nh. S. Minn., p. 43, 1893.	Granite.	
	Q 18.0 or 3.9 ab 51.4 an 17.8	di 1.2 hy 4.6 mt 4.6	Cristallina Thal, St. Gotthard, Switzerland.	Grubenmann and Anderwert.	U. G. Grubenmann, Mt.Thurg. Nf. Ges., X, p. 17, 1892.	Granite.	

SUBRANG 3. PRESODIC.

FeS_2 trace CuS_2 trace	Q 28.6 or 6.1 ab 18.3 an 28.1 C 4.1	hy 11.0 mt 2.3	Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Ess. River, p. 34, 1900.	Hornblende-granitite-gneiss.	Dried at 110°. Near bandose.
	Q 22.9 or 8.3 ab 26.7 an 30.6 C 0.9	hy 5.8 mt 5.1	Wistra, Carinthia, Austria.	H. Krezmar.	F. Becke, T. M. P. M., XVIII, p. 94, 1899.	Tonalite-gneiss.	

ORDER 5. PERFELIC. CANADARE.

SUBRANG 3. SODIPOTASSIC. PHLEGROSE.

ZrO_2 0.11 Cl 0.05 F 0.08 FeS_2 0.07	Q 8.8 or 35.6 ab 42.4 an 3.6	di 3.4 hy 2.4 mt 2.1 il 0.9	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 68, 1897.	Syenite.	
ZrO_2 0.13 Cl 0.04 F 0.08 FeS_2 none NiO none	Q 8.3 or 33.4 ab 42.4 an 5.0	di 3.7 hy 3.2 mt 2.6 il 1.2	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p 69, 1897.	Syenite-porphyry.	
	Q 0.4 or 36.1 ab 54.0 an 3.3	di 1.2 hy 2.0 mt 3.0	Salem Neck, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VI, p. 806, 1898.	Hedrumitic pulaskite.	
	or 35.6 ab 47.2 an 3.6 ne 4.5	di 2.4 ol 3.0 mt 3.0	Coney Island, Salem Harbor, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 118, 1899.	Sölvsbergite.	Dried at 110°. Near nordmarkose. Cf. No. 3.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. NORDMARKASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
5	60.13	20.05	2.36	1.33	0.76	0.87	6.30	5.97	1.41	0.16	none	1.15	0.06	trace		100.72	
A1 I	1.002	.196	.015	.018	.019	.016	.101	.064				.014	—	—			
6	59.70	18.85	4.85	n.d.	0.68	1.34	6.29	5.97	1.88							99.56	
A4 IV	.995	.185	.030	(.060)	.017	.024	.101	.064									
7	66.03	18.49	2.18	0.22	0.39	0.96	5.22	5.86	0.85		trace		0.04	trace		100.24	
A3. III	1.101	.181	.014	.003	.010	.017	.084	.063					—	—			
8	66.55	16.35	4.00	n. d.	0.38	1.34	5.40	4.97	0.40			0.66				100.05	
A3 III	1.109	.160	.025	(.050)	.010	.024	.087	.054				.008					
9	68.01	17.48	0.41	n. d.	.046	trace	5.77	7.08	0.73							99.94	2.60
A3. III	1.134	.171	.003	(.006)	.012	—	.093	.075									
10	66.13	17.40	2.19	n. d.	0.04	0.81	5.28	5.60	1.22			0.74		0.13		99.54	
A3 III	1.102	171	.014	(.028)	.001	.014	.085	.060				.009		.002			
11	64.04	17.92	0.96	2.08	0.59	1.00	6.67	6.08	1.18			0.62		0.23		101.37	2.646
B2 III	1.067	.176	.006	.029	.015	.018	.108	.065				.008		.003			
12	62.30	17.05	1.30	2.46	0.57	1.20	5.14	6.18	0.45		2.65	trace	trace			99.73	
A3. III	1,038	.167	.008	.034	.014	.021	.083	.066					—				
13	59.24	18.97	3.30	1.20	0.12	2.06	4.87	9.14	0.86	—		0.47				100.34	2.509
A2. II	.987	.186	.021	.017	.003	.037	.079	.099				.006					
14	61.62	18.24	2.36	1.28	0.56	1.44	5.77	7.60	0.78	—		0.87		trace		100.67 .03	
A2 II	1.027	.179	.015	.018	.014	.026	.093	.081				.011		—		100.64	
15	61.88	18.21	2.19	1.38	0.61	1.15	6.89	6.72	0.37	—		0.69		trace		100.39 .07	
A2. II	1.031	.178	.014	.019	.015	.021	.111	.071				.009		—		100.32	
16	60.33	18.74	2.84	1.29	0.38	1.15	7.15	7.30	0.56	—		trace		trace		100.17 .11	
A3. III	1.006	.184	.018	.018	.010	.021	.115	.078				—		—		100.06	
17	59.79	19.71	2.95	1.08	0.36	1.19	6.79	7.10	0.24			trace		trace		99.74 .13	
A3. III	.997	.193	.018	.015	.009	.021	.110	.076				—		—		99.61	
18	61.22	18.01	1.32	4.51	0.44	1.88	6.49	5.93	0.46			.042		trace		100.68	2.210
A2. II	1.020	.177	.008	.063	.011	.034	.105	.063				.005		—			

RANG 1. PERALKALIC. NORDMARKASE.

1	60.39	22.57	0.42	2.26	0.13	0.32	8.44	4.77	0.57		trace			0.08		99.95	
A3. III	1.007	.221	.003	.031	.003	.006	.136	.051						.001			
2	63.09	18.44	2.90	1.36	0.16	1.00	7.25	5.23	0.62	0.21		0.45		trace		100.77	
A2. II	1.052	.180	.018	.019	.004	.018	.117	.056				.006		—			
3	60.60	18.28	2.85	2.67	0.52	0.99	6.66	5.73	0.69			0.71	0.15			99.85	
	1.010	179	.018	.037	.013	.018	.107	.061				.009	.001				

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 3. SODIPOTASSIC. PHLEGROSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO$_2$ SO$_3$	0.05 0.14	or 35.6 ab 49.3 an 4.4 ne 2.0 C 1.5	ol 1.4 mt 0.9 il 2.2 hm 1.8	Braddock's Quarry, Fourche Mountains, Arkansas.	H. S. Washington.	H. S. Washington, J. G., IX, p. 610, 1901.	Foyaite.	Cf. No. 6.
		or 35.6 ab 42.4 an 5.3 ne 5.7	di 1.3 ol 6.9	Braddock's Quarry, Fourche Mountains, Arkansas.	W. A. Noyes.	J. F. Williams, A. R. G. S., Ark., 1890, II, p. 81, 1891.	Nephelite-syenite.	Cf. No. 5.
		Q 10.5 or 35.0 ab 44.0 an 4.7 C 1.7	hy 1.0 mt 0.7 hm 1.8	Game Ridge, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 324, 1896.	Trachyte.	Also in Pr. Col. Sc. Soc., II, p. 237, 1887.
		Q 10.1 or 30.0 ab 45.6 an 4.2	di 1.6 hy 5.9 il 1.2	Hvitus Kridh Snäffelsjökull, Iceland.	Bäckström.	H. Bäckström, G. F. F., XIII, p. 659, 1891.	Liparite.	Near pulaskose.
		Q 6.5 or 41.7 ab 48.7 C 0.3	hy 2.1	Goodwick, Pembrokeshire, Wales.	F. E. Tadman.	F. R. C. Reed Q. J. G. S., [illegible], p. 177, 1895.	Felsite.	
		Q 11.5 or 33.4 ab 44.5 an 2.8 C 1.6	hy 2.7 il 1.4	Between Thinghoud and Fjelebua, Norway.	R. Mauzelius.	W. C. Brögger, Z. K., XVI, p. 46, 1890.	Akerite.	
		or 36.1 ab 54.5 an 0.8 ne 1.1	di 8.6 ol 1.4 mt 1.4 il 1.2	Tonsenas, n. Christiania, Norway.	P. Jannasch.	O. Lang, Nyt. Mag., XXX, p. 40, 1886.	Nordmarkite.	Also in W. C. Brögger, Z. K., XVI, p. 56, 1890. Sum high.
FeS$_2$	0.43	Q 3.9 or 36.7 ab 43.5 an 5.0	di 0.8 hy 4.5 mt 1.9	Gjefsen, Gran, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg. I, p. 131, 1894.	Bostonite.	Not fresh.
SO$_3$	0.10	or 55.0 ab 25.7 an 2.2 ne 8.5	di 0.7 wo 3.1 mt 2.6 il 0.9 hm 1.6	West of Viterbo, Italy.	H. S. Washington.	H. S. Washington, J. G., IV, p. 849, 1896.	Phonolite.	Dried at 110°. Block in tuff.
Cl	0.15	or 45.0 ab 41.0 an 1.4 ne 4.3	di 3.1 wo 0.8 mt 1.9 il 1.5 hm 1.1	Monte Rotaro, Ischia, Italy.	H. S. Washington.	H. S. Washington, A. J. S., VIII, p. 289, 1899.	Trachyte.	Dried at 110°.
Cl	0.30	or 39.5 ab 45.6 ne 1.4 so 3.9	ac 1.4 di 3.3 wo 0.8 mt 2.6 il 1.4	Marecocco, Ischia, Italy.	H. S. Washington.	H. S. Washington, A. J. S., VIII, p. 289, 1899.	Trachyte.	Dried at 110°.
Cl	0.43	or 43.4 ab 36.7 ne 5.1 so 5.9	ac 1.4 di 3.0 wo 1.0 mt 3.5	Monte Nuovo, Phlegrean Fields, Italy.	H. S. Washington.	H. S. Washington, A. J. S., VIII, p. 287, 1899.	Trachyte.	Dried at 110°.
Cl	0.53	or 42.3 ab 37.7 an 5.8 ne 2.8 so 6.8	ol 0.7 mt 4.1	Monte di Cuma, Phlegrean Fields, Italy.	H. S. Washington.	H. S. Washington, A. J. S., VIII, p. 287, 1899.	Trachyte.	Dried at 110°.
		or 35.0 ab 45.6 an 2.5 ne 5.1	di 6.1 ol 3.7 mt 2.6	Gough's Island, South Atlantic.	L. V. Pirsson.	L. V. Pirsson, A. J. S., XLV, p. 382, 1893.	Trachyte-obsidian.	Near nordmarkose. Almost in germanare.

SUBRANG 4. DOSODIC. NORDMARKOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 28.4 ab 52.4 an 1.7 ne 10.2 C 2.9	ol 3.1 mt 0.7	Litchfield, Maine.	L. G. Eakins.	W. S. Bayley, B. G. S. A., III, p. 241, 1892.	Litchfieldite.	
ZrO$_2$	0.06	or 31.1 ab 59.2 an 2.0 ne 1.1	di 1.0 wo 0.8 mt 3.0 il 0.9 hm 0.8	Salem Neck, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VI, p. 806, 1898.	Pulaskite.	
		or 33.9 ab 50.3 an 3.3 ne 8.1	di 1.4 ol 1.4 mt 4.2 il 1.4	Coney Island, Salem Harbor, Massachusetts.	M. Dittrich.	H. Rosenbusch, Elemente, p. 199, 1898.	Syenite-porphyry. Sölvsbergite.	Cf. No. 4.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. NORDMARKASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
4	60.05	19.97	4.32	1.04	0.23	0.91	7.69	3.24	1.26	0.15		0.11		0.79		100.04	2.708
A2. II	1.001	.196	.027	.014	.005	.016	123	.034				.001		.011			
5	59.31	22.50	1.93	1.40	0.17	0.46	7.98	4.08	1.12	0.15		0.32		trace		99.42	2.599
B2. III	.989	.221	.012	.019	.004	.008	.129	.043				.004		—			12°
6	59.62	18.67	5.07	n. d.	0.84	1.80	6.95	5.65	0.80							99.40	
B4. V	.994	.185	.032	(.064)	.021	.032	.112	.061									
7	67.77	17.57	n. d.	1.59	0.49	0.51	6.20	4.56	1.47	0.73						100.89	
B4. V	1.130	.172	—	.022	.012	.009	.100	.049									
8	61.08	18.71	1.91	0.63	0.08	1.58	8.68	4.63	2.21			0.18	n. d.	trace	0.05	99.86	2.582
A1. I	1.018	.185	.012	.009	.002	.028	.140	.049				.002	—	—	—		
9	66.22	16.22	1.98	0.16	0.77	1.32	6.49	5.76	0.24	0.08		0.22	0.10	trace	0.29	99.97	
A1. I	1.104	.159	.012	.002	.019	.023	.105	.061				.003	.001	—	.002		
10	64.33	17.52	3.06	0.94	0.34	0.56	7.30	4.28	0.95	0.04		trace	trace	0.35		99.67	
A3. III	1.072	.172	.019	.013	.009	.010	.117	.046				—	—	.005			
11	62.17	18.58	2.15	1.05	0.73	1.57	7.56	3.88	1.63	0.07		trace	0.11	trac		99.50	
A3. III	1.036	.182	.013	.015	.018	.028	.122	.041				—	.001	—			
12	63.24	17.98	2.67	0.85	0.63	0.93	6.27	5.47	0.80	0.37	none	0.38	0.22	0.04	0.25	100.14	
A1. I	1.054	.176	.017	.012	.016	.016	.101	.059				.005	.002	.001	.002		
13	65.51	16.89	1.41	2.52	0.39	1.19	6.42	5.02	0.16			0.92	0.07	0.31		100.81	
A2. II	1.092	.165	.009	.035	.010	.021	.103	.054				.011	—	.004			
14	66.50	16.25	2.04	0.19	0.18	0.85	7.52	5.53	0.50			0.70	trace	0.20		100.46	
A2. II	1.108	.159	.013	.003	.005	.015	121	059				.009	—	.003			
15	64.92	16.30	3.62	0.84	0.22	1.20	6.62	4.98	0.50					0.40		99.60	
A3. III	1.082	.160	.023	.012	.006	.021	.107	053						.006			
16	64.54	18.13	2.63	0.97	0.67	0.62	6.60	5.99	0.31			trace	trace	trace	0.42	100.88	
A3. III	1.076	.178	.016	.013	.017	.011	107	064				—	—	—	.003		
17	63.20	17.45	3.60	n. d.	0.75	1.40	6.90	5.88	0.50			0.46				100.14	
A3. III	1.053	.171	.022	(.038)	.019	.025	.111	.063				.006					
18	60.11	19.01	4.63	0.37	0.23	0.66	6.53	5.36	1.37		0.84	0.96		trace		100.07	
A2. II	1.002	.186	.029	.005	.006	.012	.105	.057				.012		—			
19	63.76	17.37	0.10	1.11	0.93	1.72	6.69	5.97	0.40		none	0.70	0.16	0.37		99.28	
B2. III	1.063	.170	.001	.015	.023	.030	.108	.064				.009	.001	.005			
20	63.61	16.34	4.30	2.08	0.37	1.42	6.21	5.54	0.77					trace		100.82	
A3. III	1.060	.160	.027	.030	.009	.025	.100	.059						—			
21	62.04	17.44	4.22	0.36	1.88	0.57	6.31	4.20	1.63			0.71	0.37			99.85	2.620
A2. II	1.034	.171	.026	.005	.047	.010	.101	.045				.009	.002				
22	63.74	17.86	4.27	0.30	0.10	0.83	7.23	5.19	0.83			trace		0.19		100.54	
A3. III	1.062	.175	.027	.004	.003	.015	.117	.056				—		.003			

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 4 DOSODIC. NORDMARKOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl	0.28	Q 1.3 or 18.9 ab 64.5 an 4.4 C 2.3	hy 0.6 mt 3.2 hm 2.0	Gale's Point, Essex County, Massachusetts.	A. S. Eakle.	A. S. Eakle, A. J. S., VI, p. 491, 1898.	Biotite-tinguaite.	Not fresh.
		or 23.9 ab 59.2 an 2.2 C 4.2	ol 1.1 mt 2.8 il 0.6	Great Haste Island, Salem Harbor, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VI, p. 803, 1898.	Foyaite.	
		or 33.9 ab 40.3 an 3.3 ne 9.9	di 4.6 ol 6.3	Saline County, Arkansas.	W. A. Noyes.	J. F. Williams, A. R. G. S., Ark., 1890, II, 135, 1891.	Nephelite-syenite.	
		Q 11.0 or 27.2 ab 52.4 an 2.5 C 1.4	hy 4.1	Ulster Mine, Preston, Black Hills, South Dakota.	Flintermann.	J. D. Irving, A. N. Y. Ac. Sc., XII, p. 277, 1899.	Quartz-porphyry.	
Cl	0.12	or 27.2 ab 54.0 an 1.1 ne 10.5	di 0.4 wo 2.5 mt 2.1 il 0.3	Devil's Tower, Black Hills, South Dakota.	L. V. Pirsson.	L. V. Pirsson, A. J. S., XLVII, p. 344, 1894.	Phonolite.	
SO_3 Cl F SrO Li_2O	0.02 0.04 trace 0.06 trace	Q 5.3 or 33.9 ab 51.9	ac 2.8 di 1.4 wo 1.6 il 0.3 hm 1.0	Gray Butte, Bearpaw Mountains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., I, p. 295, 1896.	Quartz-syenite-porphyry.	
		Q 3.9 or 25.6 ab 61.3 an 2.8	hy 0.9 mt 3.0 hm 1.0	Sixteen-mile Creek, Crazy Mountains, Montana.	W. H. Melville.	Wolff and Tarr, B. M. C. Z., XVI, p. 232, 1893.	Acmite-trachyte.	
		Q 0.6 or 22.8 ab 63.8 an 5.3	di 2.0 hy 1.1 mt 3.2	North part of Crazy Mountains, Montana.	W. H. Melville.	Wolff and Tarr, B. M. C. Z., XVI, p. 232, 1893.	Acmite-trachyte.	
ZrO_2 S Cr_2O_3 V_2O_3 SrO	trace trace none 0.01 0.03	Q 2.8 or 32.8 ab 52.9 an 4.4	hy 1.6 mt 1.6 il 0.8 hm 1.6	Dike Mountain, Yellowstone National Park.	W. F. Hillebrand.	Hague and Jaggar, B. U. S. G. S., 168, p. 98, 1900.	Biotite-trachyte.	
		Q 5.8 or 30.0 ab 54.0 an 2.2	di 3.6 hy 1.6 mt 2.1 il 1.7	San Mateo Mountain, Mount Taylor region, New Mexico.	T. M. Chatard.	J. S. Diller, B. U. S. G. S., 148, p. 185, 1897.	Andesite.	
		Q 4.7 or 32.8 ab 52.4	ac 6.0 ns 1.0 di 1.1 wo 0.4 il 0.5 tn 1.2	Kvelle Kerke, Laugendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 216, 1898.	Lestiwarite.	
		Q 5.7 or 29.5 ab 56.1	di 1.3 wo 1.8 mt 2.8 hm 1.8	Sölvsberget, Gran, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., I, p.78, 1894.	Sölvsbergite.	
		Q 0.9 or 35.6 ab 56.1 an 2.0	di 0.9 hy 1.3 mt 3.6	Lövas Bay, Farris, Norway.	P. Schei.	W. C. Brögger, Eg. Kg., III, p. 198, 1899.	Pulaskite.	
		or 35.0 ab 48.2 ne 5.4	ac 1.4 di 5.9 ol 2.4 il 0.9	Tonsenas, n. Christiania, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 54, 1890.	Nordmarkite.	
		or 31.7 ab 55.0 an 3.2 C 1.2	hy 0.6 il 0.8 hm 4.6	Hedrum, Laugendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 203, 1899.	Bostonite.	
		or 35.6 ab 52.4 ne 2.0	ac 0.5 di 6.7 il 1.2	Ahvenvaara, Kuusamo, Finland.	N. Sahlbom.	V. Hackmann, B. C. G., I, Finl, II, p. 35, 1900.	Pyroxene-syenite.	
Cl	0.18	Q 6.4 or 32.8 ab 47.2 an 0.8 so 2.3	di 2.7 wo 1.5 mt 6.3	Kühlsbrunnen, Siebengebirge, Rhenish Prussia.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn, LIII, p. 44, 1896.	Ægirite-trachyte.	
SO_3	0.12	Q 5.5 or 25.0 ab 52.9 an 2.8 C 1.5	hy 4.7 il 1.2 hm 4.2	Near Rothe Mühle, Thuringerwald, Germany.	Hampe.	H. Loretz, Jb. Pr. G. L–A. (1888), p. 300, 1889.	Biotite-porphyrite.	SO_3 for S.
		Q 0.2 or 31.1 ab 61.8 an 0.6	di 0.7 wo 1.2 mt 0.9 hm 3.7	Edda Gijorgis, Abyssinia.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 266, 1900.	Sölvsbergite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. NORDMARKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	67.53	18.57	1.13	0.08	0.24	0.55	11.50	0.10	0.31	0.15		0.07	0.11	trace		100.34	
A2. II	1.126	.182	.007	.001	.006	.010	.185	.001				.001	.001	—			
2	63.01	18.48	0.06	0.32	0.06	2.66	10.01	0.39	0.27	0.05	2.01	0.13	0.06	0.06	0.02	99.69	
A1. I	1.050	.181	—	.004	.002	.048	.161	.004				.002	—	.001	—		
3	62.53	18.72	3.26	0.34	0.08	0.54	11.77	0.79	0.68					0.16		99.95	2.699
A3. III	1.042	.184	.020	.005	.002	.010	.190	.008						.002			

RANG 2. DOMALKALIC. PULASKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	58.21	19.90	4.07	0.87	0.98	3.58	2.57	9.17	0.74	—		trace				100.09	
A3. III	.970	.195	.025	.012	.025	.064	.041	.098									
2	57.32	19.85	2.21	2.35	1.60	3.82	3.22	9.15	0.57							100.09	2.611
A3. III	.955	.195	.014	.033	.040	.068	.052	.097									
3	55.17	20.49	3.27	2.74	1.58	3.73	2.27	9.58	0.99					trace		99.82	
A3. III	.920	.201	.020	.038	.040	.066	.037	.105						—			
4	66.25	18.74	1.36	n. d.	0.50	1.23	3.04	8.80	0.22							100.14	
A3. III	1.104	.183	.009	(.018)	.013	.022	.051	.094									

RANG 2. DOMALKALIC. PULASKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	60.75	19.68	1.54	2.98	0.81	2.29	4.89	5.90	0.08	0.24		0.63	trace	trace		99.79	
A2. II	1.013	.193	.010	.041	.020	.041	.079	.063				.008	—	—			
2	62.28	19.17	3.39	n. d.	Trace.	1.44	5.37	5.93	2.33							99.91	2.648
A4. IV	1.038	.188	.021	(.042)	—	.026	.087	.063									
3	65.65	16.84	n. d.	4.01	0.13	2.47	5.27	5.04	0.30							99.71	
A4. IV	1.094	.165	—	.056	.003	.045	.085	.054									
4	63.45	18.31	0.42	3.56	0.35	2.93	5.06	5.15	0.30			0.07	trace	none	0.13	99.73	2.717
A2. II	1.058	.179	.003	.050	.009	.051	.081	.056				.001	—	—	.001		20°
5	60.20	20.40	1.74	1.88	1.04	2.00	6.30	6.07	0.23	0.10	none	0.14	0.15	trace		100.47	
A1. I	1.003	.200	.011	.026	.026	.036	.102	.065				.002	.001	—			
6	60.03	20.76	4.01	0.75	0.80	2.62	5.96	5.48	0.53	0.06			0.07	trace		101.07	2.656
B2. III	1.001	.203	.031	.011	.020	.047	.096	.059					—	—			
7	59.23	19.98	4.72	n. d.	1.10	2.41	5.47	5.76	1.38							100.05	2.521
A4. IV	.971	.196	.030	(.060)	.028	.043	.089	.062									
8	65.54	17.81	0.74	1.15	0.98	1.92	5.55	5.58	0.54			0.11		trace		99.92	
A2. II	1.092	.175	.005	.016	.025	.034	.090	.059				.001		—			
9	57.18	18.54	3.65	1.15	0.69	2.31	4.48	8.58	2.10			0.30	0.05	trace	0.49	100.35 .17	
A1. I	.953	.182	.023	.016	.017	.041	.072	.091				.004	—	—	.003	100.18	

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 5. PERSODIC. TUOLUMNOSE

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO	trace	or 0.6 ab 95.4	ac 1.4 di 1.3 wo 0.5 mt 0.2 hm 0.5	Moccasin Creek, Tuolumne County, California.	H. N. Stokes.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 727, 1896.	Soda-syenite-porphyry.	
FeS_2 SrO Li_2O	2.10 trace none	or 2.2 ab 83.3 an 4.4 ne 0.6	di 1.2 wo 3.1 il 0.3 pr 2.1	Treadwell mine, Douglas Island, Alaska.	W. F. Hillebrand.	G. F. Becker, 18 A. R. U. S. G. S., III, p. 39, 1888.	Soda-syenite.	Not fresh.
ZrO_2	1.08	or 4.4 ab 74.4 ne 9.7 Z 1.5	ac 6.5 di 0.4 wo 1.0 mt 1.2	Mariupol, Sea of Azof, Russia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XXI, p. 241, 1902.	Mariupolite (nephelite-syenite).	Not average sample. Too little nephelite.

SUBRANG 2. DOPOTASSIC. VULSINOSE.

		or 54.5 ab 21.5 an 15.6	di 1.8 ol 1.2 mt 2.8 hm 2.0	Bolsena, n. Orvieto, Italy.	H. S. Washington.	H. S. Washington, J. G., IV, p. 552, 1896.	Vulsinite.	
		or 53.9 ab 14.7 an 12.8 ne 6.8	di 5.0 ol 2.9 mt 3.2	Vetralla, n. Viterbo, Italy.	H. S. Washington.	H. S. Washington, J. G., IV, p. 849, 1896.	Vulsinite.	Dried at 110°.
		or 58.4 ab 7.3 an 16.4 ne 6.5	di 1.6 ol 4.1 mt 4.6	San Rocco, Mte. Vico, n. Viterbo, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 370, 1897.	Leucite-trachyte.	
		Q 9.6 or 52.3 ab 26.7 an 6.1 C 1.6	hy 3.6	Rio Pardo, Serra de Caldas, Brazil.	E. Hussak.	E. Hussak, N. J., 1900, I, p. 25.	Leucite-granite-porphyry.	Near S. R. 2 of syenase. Recalc. from 2 partial anals.

SUBRANG 3. SODIPOTASSIC. PULASKOSE.

		Q 2.2 or 35.0 ab 41.4 an 11.4	di 4.9 mt 2.3 il 1.2	Mount Belknap, New Hampshire.	H. S. Washington.	H. S. Washington, private contribution.	Syenite.	
		Q 2.7 or 35.0 ab 45.6 an 7.2 C 1.2	hy 5.5	Nash's Point, Burlington, Vermont.	J. F. Kemp.	Kemp and Marsters, B. U. S. G. S. 107, p. 20, 1893.	Bostonite.	
		Q 7.8 or 30.0 ab 44.5 an 7.2	di 4.6 hy 5.3	Harrisville, Adirondack Mountains, New York.	C. H. Smyth, jr.	C. H. Smyth, jr., B. G. S. A., VI, p. 274, 1895.	Gabbro.	
		Q 5.2 or 31.1 ab 42.4 an 11.7	di 2.2 hy 6.0 mt 0.7	Loon Lake, Franklin County, New York.	E. W. Morley.	H. P. Cushing, B. G. S. A., X, p. 183, 1899.	Augite-syenite.	
ZrO_2 SO_3 Cl S	trace 0.13 0.09 none	or 36.1 ab 41.9 an 9.2 ne 6.2	di 0.8 ol 3.1 mt 2.6 il 0.3	Fourche Mountain, n. Little Rock, Arkansas.	H. S. Washington.	H. S. Washington, J. G., IX, p. 609, 1901.	Pulaskite.	
		or 32.8 ab 45.6 an 13.3 ne 2.6	ol 1.4 mt 2.6 hm 3.2	Fourche Mountain, n. Little Rock, Arkansas.	R. N. Brackett.	J. F. Williams, A. R. G. S. Ark., 1890, II, p. 70, 1890.	Pulaskite.	
		or 34.5 ab 38.3 an 12.0 ne 4.5	ol 8.0	Fourche Mountain, n. Little Rock, Arkansas.	W. A. Noyes.	J. F. Williams, A. R. G. S., Ark., 1890, II, p. 88, 1891.	Nephelite-syenite.	
Li_2O	trace	Q 6.1 or 32.8 ab 47.2 an 7.2	di 1.9 hy 3.1 mt 1.2	Highwood Peak, Highwood Mountains, Montana.	Pirsson and Mitchell.	Weed and Pirsson, A. J. S., I, p. 295, 1896.	Quartz-syenite.	
SO_3 Cl SrO	0.06 0.77 trace	Q 5.1 or 50.6 ab 14.7 an 8.7 so 11.0	di 2.3 hy 0.6 mt 2.8 il 0.6 hm 1.8	South Mountain, Highwood Mountains, Montana.	H. W. Foote.	L. V. Pirsson, B. U. S. G. S. 148, p. 152, 1897.	Trachyte.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. PULASKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
10	56.45	20.08	1.31	4.39	0.63	2.14	5.61	7.13	1.51	0.26		0.29	0.13	0.09		100.45 .10	
A2. II	.941	.197	.008	.061	.016	.038	.090	.075				.004	.001	.001		100.35	
11	60.89	17.14	3.32	0.95	1.16	3.58	4.54	5.71	1.22	0.39		0.49	0.27	0.09		99.94	
A2. II	1.015	.168	.020	.015	.029	.064	.071	.061				.006	.002	.001			
12	57.73	18.93	1.97	1.92	0.91	2.78	5.52	6.11	2.93	0.22	0.26	0.33	0.25	0.06	0.16	100.20	
A1. I	.962	.185	.013	.027	.023	.050	.089	.065				.004	.002	.001	.001		
13	65.41	18.78	0.94	0.72	0.16	1.58	5.91	5.41	1.38				trace	trace		100.29	
A3. III	1.090	.184	.006	.010	.004	.029	.095	.058					—	—			
14	62.64	17.82	3.91	0.31	0.47	3.22	4.47	4.99	0.65	0.58		0.59	0.25	0.04	0.28	100.37	
A1. I	1.044	.175	.024	.004	.012	.057	.072	.054				.007	.002	—	.002		
15	58.94	17.19	2.63	1.98	1.52	4.45	4.20	3.90	4.53			0.27	0.23	0.10		99.94	
A2. II	.982	.169	.016	.028	.038	.079	.068	.041				.003	.002	.001			
16	62.60	18.07	2.28	2.25	1.16	2.27	5.49	5.22	0.50							99.84	
A3. III	1.043	.177	.014	.031	.029	.041	.089	.056									
17	64.69	18.34	n. d.	3.44	0.50	1.72	4.61	6.46	0.24			0.31	0.18	trace	0.09	100.58	2.57
A3. III	1.078	.180	—	.048	.013	.031	.074	.069				.004	.001	—	.001		
18	62.66	17.34	0.54	2.16	1.44	3.17	4.51	6.34	1.66				trace	0.12		99.94	
A3. III	1.044	.170	.003	.030	.036	.057	.072	.067					—	.002			
19	59.46	20.18	4.17	n. d.	0.82	2.83	5.13	6.65	0.55							99.79	
A4. IV	.991	.198	.026	(.052)	.021	.050	.082	.071									

RANG 2. DOMALKALIC. PULASKASE.

1	58.27	23.75	1.86	n. d.	trace	1.89	6.90	5.17	2.30							100.14	2.60
A3. III	.971	.232	.012	(.024)	—	.034	.111	.056									
2	64.63	18.15	3.05	n. d.	0.50	1.54	5.80	4.79	1.08					1.00		100.54	
A4. IV	1.077	.178	.020	(.040)	.013	.028	.093	.051						.014			
3	59.25	19.46	n. d.	5.08	trace	2.07	7.39	3.96	2.12	0.70						100.03	
A4. IV	.988	.191	—	.071	—	.038	.119	.042									
4	57.21	18.67	n. d.	3.41	1.10	3.07	6.62	4.92	3.61	1.01						99.62	
A4. IV	.954	.183	—	.048	.027	.055	.106	.053									
5	64.40	16.90	1.86	1.37	1.13	2.60	5.79	4.56	0.39	0.16	none	0.23	0.21	none	0.27	100.10	
A1. I	1.073	.166	.012	.019	.027	.047	.093	.049				.003	.001	—	.002		
6	63.07	17.47	2.09	1.38	1.44	2.27	5.77	4.59	0.43	0.25	none	0.38	0.18	0.03	0.32	99.84	
A1. I	1.051	.171	.013	.019	.036	.041	.093	.049				.005	.001	—	.002		
7	63.49	18.40	2.44	1.09	0.66	2.30	5.70	4.62	1.04		trace	trace	trace	0.16		99.90	
A3. III	1.058	.180	.015	.015	.017	.041	.092	.049				—	—	.002			
	60.98	19.09	1.76	1.15	0.65	3.67	6.70	3.53	0.44	0.48	0.52	0.36	0.10	0.15	0.43	100.29	
	1.016	.187	.011	.016	.016	.066	.108	.037				.005	.001	.002	.003		

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 3. SODIPOTASSIC. PULASKOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl NiO	0.43 trace	or 41.7 ab 28.3 an 10.6 ne 3.4 so 5.9	ol 6.1 mt 1.9 il 0.6	Square Butte, Highwood Mountains, Montana.	W. H. Melville.	Lindgren and Melville, A. J. S., XLV, p. 296, 1893.	Sodalite-syenite.	
NiO	0.19	Q 5.8 or 33.9 ab 37.2 an 10.0	di 6.1 mt 2.1 il 0.9 hm 1.8	Stinkingwater River, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, J. G., III, p. 947, 1895.	Quartz-banakite.	
ZrO_2 Cr_2O_3 V_2O_3 SrO Li_2O	trace trace 0.01 0.09 trace	or 36.1 ab 37.7 an 8.6 ne 4.8	di 4.5 ol 1.0 mt 3.0 il 0.6	Dike Mountain, Yellowstone National Park.	W. F. Hillebrand.	Hague and Jaggar, B. G. S. G. S. 168, p. 98, 1900.	Biotite-trachyte.	
		Q 6.4 or 32.2 ab 49.8 an 8.1 C 0.2	hy 1.0 mt 1.4	Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, Pr. Colo. Sc. Soc., II, p. 233, 1887.	Trachyte.	Also in 17 A. R. U. S. G. S., II, p. 324, 1896.
ZrO_2 SrO	0.08 0.07	Q 10.2 or 30.0 ab 37.7 an 13.6	di 1.8 hy 0.4 il 0.6 hm 3.9	Bare Hills, Pike's Peak, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 148, p. 163, 1897.	Andesite.	
		Q 8.5 or 22.8 ab 35.6 an 16.7	di 4.4 hy 3.8 mt 3.7 il 0.5	Pringle Hill, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 324,1896.	Andesite.	Near laurvikose.
		Q 3.2 or 31.1 ab 46.6 an 8.9	di 2.1 hy 4.2 mt 3.2	Ullernas, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 49, 1890.	Akerite-porphyry.	Main mass. For border cf. No. 6. Salemose.
SO_3 Cl F	none trace trace	Q 6.1 or 38.3 ab 38.8 an 8.6 C 0.6	hy 7.0 il 0.6	Algersdorf, Bohemia.	F. Ullik.	J. E. Hibsch, T. M. P. M., IX, p. 247, 1888.	Trachyte.	
		Q 3.5 or 37.3 ab 37.7 an 8.6	di 5.9 hy 4.2 mt 0.7	Monte Ciliano, Viterbo, Italy.	L. Ricciardi.	A. Verri, B. S. G. Ital., VIII, p. 403, 1889.	Trachyte.	
		or 39.5 ab 35.1 an 12.0 ne 4.3	di 1.7 ol 6.0	Rocov-Kamik, n. Sofia, Bulgaria.	L. Dimitrow.	L. Dimitrow, Ds. Wien. Akad., LX, p. 497, 1893.	Pyroxene-syenite.	

SUBRANG 4. DOSODIC. LAURVIKOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 31.1 ab 43.5 an 9.5 ne 8.0 C 3.2	ol 2.4	Methuen Township, Peterborough County, Ontario.	W. G. Miller.	W. G. Miller, Rep. Bur. Mines. Tor., VIII, pt. 2, p. 207, 1899.	Nephelite-syenite.	
		Q 6.2 or 28.4 ab 48.7 an 7.8 C 0.6	hy 6.6	Fourche Mountain, n. Little Rock, Arkansas.	R. N. Brackett.	J. F. Williams, A. R. G. S. Ark., 1890, II, p. 96, 1891.	Quartz-syenite.	MnO high.
		or 23.4 ab 51.4 an 8.3 ne 6.0	di 2.1 ol 6.5	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac. Sc., XII, p. 272, 1899.	Phonolite.	
		or 29.5 ab 38.3 an 6.7 ne 9.4	di 7.4 ol 3.9	Whitetail Gulch, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac. Sc., XII, p. 272, 1899.	Phonolite.	
ZrO_2 NiO SrO Li_2O	0.02 none 0.14 trace	Q 7.1 or 27.2 ab 48.7 an 6.7	di 5.2 hy 0.8 mt 2.8 il 0.5	Copper Creek Basin, Yellowstone National Park.	W. F. Hillebrand.	Hague and Jaggar, B. U. S. G. S. 168, p. 95, 1900.	Augite-syenite-porphyry.	
ZrO_2 FeS_2 Cr_2O_3 V_2O_3 NiO SrO	trace 0.02 trace trace none 0.15	Q 5.6 or 27.2 ab 48.7 an 8.1	di 2.6 hy 2.4 mt 3.0 il 0.8	Copper Creek Basin, Yellowstone National Park.	W. F. Hillebrand.	Hague and Jaggar, B. U. S. G. S. 168, p. 95, 1900.	Quartz-syenite.	
		Q 7.0 or 27.2 ab 48.2 an 10.8	hy 1.7 mt 3.5	Pringle Hill, Rosita Hills, Colorado.	W. F. Eakins.	W. Cross, Pr. Colo. Sc. Soc., II, p. 250, 1887.	Andesite.	Also in 17 A. R. U. S. G. S., II, p. 324, 1896.
SrO Li_2O	0.28 trace	Q 1.8 or 20.6 ab 56.6 an 11.7	di 3.8 wo 1.0 mt 2.6 il 0.8	Mount Pennell, Henry Mountains, Utah.	W. F. Hillebrand.	W. Cross, 14 A. R. U. S. G. S., II, p. 227, 1894.	Augite-porphyry.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. PULASKASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
9	62.10	18.02	n. d.	3.57	0.75	2.59	6.51	4.07	1.99							100.62	
A4. IV	1.035	.176	—	.050	.019	.047	.105	.043									
10	56.19	20.25	2.76	2.32	1.12	4.30	6.33	4.19	0.65			0.57	0.54			99.47	2.674
A2. II	.937	.198	.017	.032	.028	.077	.102	.045				.007	.004				
11	60.45	20.14	3.80	n. d.	1.27	1.68	7.23	5.12	0.71							100.40	
A4. IV	1.008	.197	.024	(.048)	.032	.030	.117	.054									
12	60.72	19.90	3.56	0.85	1.25	2.75	6.24	4.16	0.61							100.04	
A3. III	1.012	.195	.022	.012	.031	.049	.101	.044									
13	59.38	19.35	4.97	0.13	0.91	4.36	5.15	3.88	0.90			1.36	0.38			100.77	
A2. II	.990	.190	.031	.002	.023	.078	.083	.041				.017	.002				
14	58.82	21.06	3.26	0.70	1.38	3.03	6.83	3.70	1.26							100.04	
A3. III	.980	.207	.020	.010	.035	.054	.110	.039									
15	57.59	22.38	3.09	0.78	2.34	3.23	6.11	3.40	0.70							99.62	
A3. III	.960	.220	.019	.011	.059	.058	.099	.036									
16	57.33	20.30	4.95	1.03	1.93	2.67	6.05	4.76	0.68							99.80	
A3. III	.967	.199	.031	.014	.048	.048	.098	.051									
17	56.85	21.56	3.44	1.14	0.85	5.26	6.07	3.66	0.52							99.35	
A3. III	.948	.211	.022	.014	.021	.094	.098	.039									
18	58.88	20.30	3.63	2.58	0.79	3.03	5.73	4.50	1.01				0.54			100.99	
B3. IV	.981	.199	.023	.036	.020	.054	.092	.048					.004				
19	57.12	21.69	1.63	3.65	1.55	4.03	5.93	3.48	0.58							99.66	
A3. III	.952	.213	.010	.051	.039	.072	.096	.037									
20	65.01	18.27	0.84	0.83	0.80	1.50	6.79	4.34	1.74							100.12	
A3. III	1.083	.179	.005	.011	.020	.027	.110	.046									
21	61.19	21.24	1.62	n. d.	trace	1.87	6.80	5.97	0.93			0.39				100.01	
A4. IV	1.020	.210	.010	(.020)	—	.034	.109	.064				.005					
22	64.69	17.32	1.23	3.01	1.54	2.18	6.36	2.30	2.09			0.44	trace	trace		101.16	2.65
B2. III	1.078	.170	.007	.042	.039	.039	.102	.024				.005	—	—			
23	55.91	19.73	2.73	1.36	0.75	2.39	7.24	2.13	4.33		1.89	trace	0.18	0.46		99.41	2.471
B1. II	.932	.193	.017	.019	.019	.043	.117	.022				—	.001	.006			
24	61.47	18.09	5.14	3.06	1.32	3.00	5.85	2.83	n. d.							100.76	
A3. III	1.025	.177	.032	.043	.033	.053	.094	.030									
25	61.43	17.51	5.11	2.30	0.54	2.45	6.22	3.95	n. d.							99.51	2.34
A3. III	1.024	.171	.032	.032	.014	.044	.100	.042									
26	60.24	20.28	2.32	3.88	0.50	1.96	7.80	4.28								101.26	
C3. V	1.004	.198	.014	.054	.013	.036	.126	.046									
27	66.71	15.82	0.71	0.32	2.05	3.92	7.12	2.42	1.01							100.08	
A3. III	1.112	.155	.004	.004	.051	.070	.114	.025									

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 4. DOSODIC. LAURVIKOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
BeO	1.02	Q 0.2 or 23.9 ab 55.0 an 7.8	di 4.5 hy 6.2	Aiguille du Charmoz, Mont Blanc, France.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine with beryl.	
SO_3 Cl	0.16 0.09	or 25.0 ab 42.4 an 14.5 ne 6.0	di 3.2 ol 1.6 mt 3.9 il 1.1 ap 1.2	Ferrera, Columbretes Islands, Spain.	R. Pfohl.	F. Becke, T. M. P. M., XVI, p. 177, 1896.	Tephritic-trachyte.	
		or 30.0 ab 46.1 an 7.3 ne 8.2	di 1.0 ol 6.8	Aueröd, n. Holmestrand, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 54, 1890.	Nordmarkite.	
		Q 0.8 or 24.4 ab 52.9 an 13.6	hy 3.1 mt 2.8 hm 1.6	Notterö, n. Tönsberg, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 35, 1890.	Rhomben-porphyry.	
		Q 4.7 or 22.8 ab 43.4 an 18.3	hy 2.3 il 0.3 hm 5.0 tn 2.4	Bollaerene, n. Tönsberg, Norway.	V. Schmelck.	W. C. Brögger. Eg. Kg., III, p. 329, 1899.	Tönsbergite.	
		or 21.7 ab 52.4 an 15.0 ne 2.8 C 0.4	ol 2.5 mt 2.8 hm 1.0	Slotsberg n. Tönsberg, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 35, 1890.	Rhomben-porphyry.	
		or 20.0 ab 51.9 an 16.1 C 2.8	ol 4.1 mt 2.6 hm 1.3	Fagerheimasen, Notterö, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 35, 1890.	Augite-syenite.	
		or 28.4 ab 45.1 an 13.3 ne 3.4 C 0.2	ol 3.3 mt 3.2 hm 2.7	Teie, Notterö, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 35, 1890.	Rhomben-porphyry.	
		or 21.7 ab 43.5 an 20.6 ne 4.3	di 4.4 mt 3.2 hm 1.3	Notterö, n. Tönsberg, Norway.	G. Forsberg.	W. C, Brögger, Z. K., XVI, p. 30, 1890.	Laurvikite.	Sum low.
		Q 1.6 or 26.7 ab 48.2 an 11.4 C 1.8	hy 3.8 mt 5.3 ap 1.2	Byskoven, n. Laurvik, Norway.	Stahl and Mansfeld.	A. Merian, N. J. B. B., III, p. 266, 1885.	Augite-syenite. (Laurvikite, W. C. B.)	Alkalies not exact.
		or 20.6 ab 46.6 an 20.0 ne 2.0 C 0.8	ol 7.0 mt 2.3	Frederiksvärn, n. Laurvik, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 30, 1890.	Laurvikite.	
		Q 4.6 or 25.6 ab 57.1 an 6.7	di 0.8 hy 2.4 mt 1.2	Frohnfeld, n. Kelberg, Eifel.	K. Vogelsang.	K. Vogelsang, Z. D. G. G., XLII, p. 10, 1890.	Trachyte.	
		or 35.6 ab 46.6 an 9.5 ne 5.4 C 0.4	ol 1.6 il 0.8	Laacher See, Rh. Prussia.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn, XLVIII, p. 324, 1891.	Sanidinite.	
		Q 10.6 or 13.3 ab 53.0 an 10.8 C 0.5	hy 7.7 mt 1.6 il 0.9	Ködelschutzteich, n. Nordhalben, Thuringia.	R. Pohlmann.	R. Pohlmann, N. J. B. B., III, p. 86, 1885.	Quartz-mica-diorite-porphyrite.	Near lassenose.
SO_3 Cl F	0.21 0.10 trace	or 12.2 ab 61.3 an 12.0 C 1.1	ol 1.5 mt 3.9	Schwintel, Hegau, Germany.	G. F. Föhr.	G. F. Föhr, In. Diss. Würzburg, p. 30, 1883.	Phonolite.	Not fresh.
		Q 7.9 or 16.7 ab 49.3 an 14.7	di 4.7 mt 7.4	Montagna Grande, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 155, 1884.	Augite-andesite.	
		Q 5.0 or 23.4 ab 52.4 an 8.1	di 3.3 mt 7.4	Porto Scauri, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 164, 1884.	Augite-andesite.	
		or 25.6 ab 50.3 an 7.2 ne 8.5	di 2.4 ol 4.1 mt 3.2	Montagna Grande, Pantelleria.	E. Maegis.	H. Förstner, Z. K., VIII, p. 155, 1884.	Augite-andesite.	
		Q 8.6 or 13.9 ab 59.7 an 4.4	di 11.3 mt 1.0	Deleng Baros, Sumatra.	W. Herz.	L. Milch, Z. D. G. G., LI, p. 66, 1899.	Dacite.	Near akerose.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. PULASKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	60.13	20.47	1.04	0.72	1.15	2.59	9.60	1.06	3.44			trace		trace		100.20	
A3. III	1.002	.201	.007	.010	.029	.046	.155	.011				—		—			
2	62.90	22.80	1.05	n. d.	0.40	3.55	8.49	0.53	0.90							100.62	
B3. IV	1.048	.223	.007	(.014)	.010	.063	.137	.005									

RANG 3. ALKALICALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	59.33	20.46	1.66	0.22	0.83	7.09	2.58	7.03	0.36	—	trace	0.10	0.05	0.16	none	100.02	
A1. I	.989	.200	.010	.003	.021	.127	.042	.074				.001	—	.002			

RANG 3. ALKALICALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	59.26	23.63	0.30	0.57	0.31	5.93	4.94	4.78	0.74							100.46	2.625
A3. III	.988	.231	.002	.008	.008	.105	.079	.051									31°

RANG 3. ALKALICALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	54.83	25.49	1.61	1.65	1.96	6.08	5.69	1.87	1.18	—	0.18					100.54	
A3. III	.914	.250	.010	.023	.049	.109	.092	.020									
2	58.28	19.37	1.35	2.98	1.30	4.78	4.40	3.75	1.78	0.44	0.33	0.96	0.35	0.07	0.25	100.48	
A1. I	.971	.190	.008	.041	.033	.085	.071	.040				.012	.002	.001	.002		

RANG 4. DOCALCIC. LABRADORASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	49.78	29.37	0.34	0.60	1.07	11.86	4.39	0.46	1.76			none		0.08	none	99.80	2.676
A2. II	.830	.288	.002	.008	.025	.211	.071	.005				—		.001	—		
2	53.43	28.01	0.75	n. d.	0.63	11.24	4.85	0.96	trace							99.87	2.673
A3. III	.891	.274	.005	(.010)	.016	.200	.078	.010									
3	53.42	28.36	1.80	n. d.	0.31	10.49	4.82	0.84	n. d.							100.04	
A3. III	.890	.278	.011	(.022)	.008	.187	.077	.009									
4	53.02	27.75	2.92	n. d.	0.93	10.12	4.67	0.81	n. d.			0.12				100.36	
A3. III	.884	.273	.018	(.036)	.023	.180	.076	.009				.001					
5	52.61	27.15	4.05	n. d.	1.55	9.96	4.53	0.78	n. d.			0.23				100.87	
A3. III	.877	.267	.025	(.050)	.039	.178	.073	.008				.003					
6	55.01	28.31	n. d.	0.73	0.40	10.42	4.52	0.61								100.00	
A3. III	.917	.277	—	.010	.010	.185	.072	.006									

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 5. PERSODIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 6.1 ab 68.6 an 9.7 ne 6.8	di 2.4 ol 1.5 mt 1.6	Fair Haven, Connecticut.	H. S. Washington.	E. O. Hovey, A. J. S., III, p. 291, 1897.	Keratophyre.	H_2O includes CO_2. Not fresh.
		Q 2.8 or 2.8 ab 71.8 an 17.5 C 1.8	hy 2.8	Jablanica, Herzegowina.	C. v. John?	C. v. John, J. v. Wien, G. R-A., XXXVIII, p. 346, 1888.	Diorite.	Al_2O_3 high? MgO low?

SUBRANG 2. DOPOTASSIC. MAZARUNOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 Cl FeS_2 CoO Cu Pb	none 0.06 0.02 0.01 0.05 0.01	Q 3.4 or 41.1 ab 22.0 an 23.4	di 4.5 wo 2.6 mt 0.7 hm 1.1	Mazaruni district, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. contrib.	Augite-syenite.	Dried at 100°.

SUBRANG 3. SODIPOTASSIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 28.4 ab 40.3 an 28.1 ne 1.0	di 1.0 ol 0.7 mt 0.5	Table Mountain, Denver, Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S., 148, p. 159, 1897.	Augite-andesite.	Pebble.

SUBRANG 4. DOSODIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 11.1 ab 47.2 an 30.3 ne 0.6 C 3.0	ol 4.9 mt 2.3	Horse Race, Menominee River, Wisconsin.	R. B. Riggs.	G. H. Williams, B. U. S. G. S., 62, p. 113, 1890.	Mica-diorite-porphyry.	Dried at 105°.
SrO Li_2O	0.09 trace?	Q 5.2 or 22.2 ab 37.2 an 22.0	di 1.4 hy 5.4 mt 1.9 il 1.8	Shield's River Basin, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 148, p. 143, 1897.	Diabase-porphyrite.	

SUBRANG 3. PRESODIC. LABRADOROSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO	none	or 2.8 ab 28.8 an 58.7 ne 4.5	ol 2.5 mt 0.5	Carlton Peak, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 281, 1900.	Plagioclasite.	
		or 5.6 ab 51.7 an 35.1 ne 3.1	di 3.4 ol 1.2	Nain, Labrador.	A. Wichmann.	A. Wichmann, Z. D. G. G., XXXVI, p. 491, 1884.	Labradorite-rock.	
		or 5.0 ab 38.3 an 52.0 C 0.5	ol 2.8	Ogne, Ekersund, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 96.	Labradorite-rock.	
		or 5.0 ab 37.7 an 50.0 ne 1.1 C 0.8	ol 5.3	Near Lister, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 113.	Labradorite-rock.	
		or 4.4 ab 37.2 an 49.5 ne 0.6 C 0.8	ol 7.7 il 0.5	Rekefjord, Ekersund, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 79.	Labradorite-rock.	
		Q 3.5 or 3.3 ab 37.7 an 51.4 C 1.4	hy 2.3	Turtschinka, Wolhynia, Russia.	J. Morozewicz.	W. Tarassenko, cf. N. J., 1899, I, p. 463.	Labradorite-rock.	

CLASS I. PERSALANE—Continued.

RANG 5. PERCALCIC. CANADASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	45.78	30.39	1.33	1.22	2.14	16.66	1.66	0.10	0.51							99.79	
A3. III	.763	.298	.008	.017	.054	.297	.027	.001									
2	47.32	30.36	1.35	1.55	2.44	15.45	1.88	0.66	0.10		0.58					101.69	2.73
C2. IV	.789	.298	.009	.022	.061	.276	.030	.007									
3	46.24	29.85	1.30	2.12	2.41	16.24	1.98	0.18	n. d.		1.03			trace		101.35	2.85
C2. IV	.771	.293	.008	.030	.060	.290	.032	.002						—			

CLASS I. PERSALANE.

RANG 1. PERALKALIC. MIASKASE.

1	53.56	24.43	2.19	1.22	0.31	1.24	6.48	9.50	0.93					0.10		99.96	
A3. III	.893	.240	.014	.017	.008	.022	.104	.101						.001			
2	55.06	23.29	3.29	n. d.	trace	1.46	6.76	8.86	1.08							99.80	
A4. IV	.918	.228	.020	(.040)	—	.026	.109	.094									
3	60.42	19.23	0.63	3.19	0.67	1.73	6.99	6.88	1.74					trace		101.48	
B3. IV	1.007	.189	.004	.044	.017	.031	.113	.073						—			
4	58.89	19.67	1.79	1.23	0.17	1.31	4.41	11.00	1.11					0.59		100.17	2.557
A3. III	.982	.193	.011	.017	.004	.023	.071	.117						.008			
5	55.18	23.03	2.85	n. d.	0.25	1.06	5.98	8.43	2.62							100.16	
A4. IV	.920	.226	.018	(.036)	.006	.020	.097	.089									
6	55.87	21.82	2.34	1.10	0.48	3.07	4.81	10.49	0.34					trace		100.32	2.551
A3. III	.931	.214	.015	.015	.012	.055	.078	.114						—			

RANG 1. PERALKALIC. MIASKASE.

1	58.30	21.38	1.05	2.04	0.22	0.95	8.66	6.06	0.45	0.35	none	0.10	0.04	trace	none	100.05 .08	
A1. I	.972	.210	.007	.029	.006	.017	.140	.065				.001	—	—	—	99.97	
2	58.77	22.53	1.54	1.04	0.19	0.74	9.62	4.89	0.90	0.07		0.31		trace	none	100.71	2.596
A2. II	.980	.220	.010	.014	.005	.013	.155	.052				.004		—	—		11°
3	56.75	20.69	3.52	0.59	0.11	0.37	11.45	2.90	3.18	0.04		0.30		trace	none	100.18 .06	2.474
A2. II	.946	.203	.022	.008	.003	.007	.185	.031				.004		—	—	100.12	22°
4	54.22	20.20	2.35	1.02	0.29	0.70	9.44	4.85	5.57	0.42	trace	0.38	0.11	0.19	trace	99.74	
A1. I	.904	.198	.015	.014	.007	.012	.152	.052				.005	.001	.003	—		
5	52.73	20.05	3.43	0.99	0.17	3.35	7.94	4.77	4.85	0.69	0.93	n. d.	trace		0.11	100.01	2.466
A3. III	.879	.197	.021	.014	.004	.060	.128	.051				—	—		.001		
6	58.74	20.85	4.15	n. d.	0.22	0.36	9.72	4.23	1.82							100.09	
A4. IV	.979	.204	.026	(.052)	.006	.007	.156	.045									

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG. NOT NEEDED.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 0.6 ab 12.1 an 75.1 ne 1.1	di 6.1 ol 2.5 mt 1.9	Burnt Head, Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXVI, p. 340, 1900.	Anorthosite.	
		or 3.9 ab 13.6 an 72.6 ne 1.1	di 3.5 ol 4.4 mt 2.1	South Sherbrooke, Ontario.	A. W. Lawson.	W. G. Miller, Rep. Bur. Mines, Tor., VII, pt. 2, p. 227, 1899.	Corundum-anorthosite.	Also in A. G., XXIV, p. 280, 1899.
		or 1.1 ab 12.1 an 72.0 ne 2.6	di 7.1 ol 3.0 mt 1.9	Mouth of Seine River, Rainy Lake region, Ontario.	A. W. Lawson.	A. P. Coleman, Rep. Bur. Mines, Tor., V, p. 99, 1896.	Anorthosite.	Also in A. G., IV, p. 909, 1896.

ORDER 6. LENDOFELIC. RUSSARE.

SUBRANG 3. SODIPOTASSIC. BEEMEROSE.

		or 56.2 ab 3.4 an 6.1 ne 27.5 C 1.3	ol 0.9 mt 3.2	Beemersville, New Jersey.	L. G. Eakins.	J. P. Iddings, B. U. S. G. S., 150, p. 211. 1898.	Nephelite-syenite.	
		or 52.3 ab 6.3 an 7.0 ne 27.5	ol 5.3	Serra de Tingua, Brazil.	E. Hussak.	E. Hussak, N. J., 1892, II, p. 146.	Leucite-tinguaite.	
		or 40.6 ab 35.0 an 0.8 ne 13.1	di 6.7 ol 2.8 mt 0.9	Moita, Foya, Portugal.	M. Dittrich.	Kraatz-Koschlau and Hackman, T. M. P. M., XVI, p. 225, 1896.	Nephelite-syenite.	Sum high.
		or 65.1 ab 13.1 an 1.4 ne 13.1	di 2.5 wo 1.0 mt 2.6	Picota, Serra de Monchique, Portugal.	A. Zilliacus.	Kraatz-Koschlau and Hackman, T. M. P. M., XVI, p. 252, 1896.	Leucite-tinguaite-vitrophyre.	
SO_3 Cl	0.44 0.32	or 49.5 ab 18.2 an 5.6 ne 7.7 so 4.9 no 3.6 C 3.0	ol 4.2	Rieden, n. Laacher See, Rhenish Prussia.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn, XLVIII, p. 246, 1891.	Leucite-phonolite.	
		or 63.4 an 6.1 ne 22.2	di 2.6 wo 2.5 mt 3.5	Lake Bracciano, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 49, 1897.	Leucite-phonolite.	Dried at 110°.

SUBRANG 4. DOSODIC. MIASKOSE.

ZrO_2 SO_3 Cl	0.02 0.08 0.35	or 36.1 ab 35.1 an 2.8 ne 15.1 so 5.0	di 1.7 ol 2.0 mt 1.6	Horne Farm, Red Hills, New Hampshire.	H. S. Washington.	H. S. Washington, Priv. contrib.	Foyaite.	
ZrO_2	0.11	or 28.9 ab 43.0 an 3.6 ne 20.7	ol 0.4 mt 2.3 il 0.6	Salem Neck, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VI, p. 803, 1898.	Foyaite.	Al_2O_3 corrected for ZrO_2.
SO_3 Cl	trace 0.28	or 17.2 ab 46.6 ne 23.6	ac 6.0 di 0.5 wo 0.5 mt 2.0	Pickard's Point, Manchester, Essex Co., Massachusetts.	H. S. Washington.	H. S. Washington, A. J. S., VI, p. 185, 1898.	Analcite-tinguaite.	Cl high?
SO_3	none	or 28.9 ab 33.5 ne 23.3	ac 2.8 di 1.5 wo 0.6 mt 2.1 il 0.8	Southboro, Massachusetts.	H. N. Stokes.	B. U. S. G. S., 148, p. 77, 1897.	Phonolite.	Not described.
		or 28.4 ab 30.9 an 5.0 ne 19.6	di 1.0 ol 4.4 mt 3.2 hm 1.1	Heron Bay, Lake Superior, Ontario.	H. W. Charlton.	A. P. Coleman, J. G., VII, p. 435, 1899.	Heronite.	Not fresh.
		or 25.0 ab 46.6 an 0.8 ne 19.0	di 1.0 ol 5.2	Saline County, Arkansas.	W. A. Noyes.	J. F. Williams, A. R. Ark. G. S., 1890, II, p. 139, 1891.	Nephelite-syenite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. MIASKASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
7	54.07	21.67	3.55	n. d.	0.36	0.36	8.91	4.76	5.44			0.15				99.27	
B3. IV	.901	.212	.022	(.044)	.009	.006	.143	.051				.002					
8	58.60	20.98	2.22	0.44	0.33	1.13	8.38	5.49	1.92							99.69	
A3. III	.977	.205	.014	.006	.008	.020	.135	.059									
9	57.86	20.26	2.35	0.39	0.04	0.89	9.47	5.19	2.40	0.21	none	0.22	0.03	0.21	0.09	99.97	
A1. I	.964	.199	.015	.005	.001	.016	.153	.055				.003	—	.003	.001		
10	59.23	21.10	n. d.	4.13	0.47	0.64	8.67	4.49	1.18	0.10						100.01	
A4. IV	.987	.207	—	.057	.012	.011	.140	.048									
11	58.59	20.77	n. d.	4.35	0.46	1.46	8.17	4.80	0.92	0.09						99.61	
A4. IV	.977	.203	—	.061	.012	.026	.132	.051									
12	58.09	21.29	n. d.	4.06	trace	0.81	9.35	3.79	2.26	0.20						99.85	
A4. IV	.968	.209	—	.057	—	.014	.151	.040									
13	57.88	20.46	n. d.	3.77	0.28	0.76	8.74	5.11	2.55	0.17						99.72	
A4. IV	.965	.200	—	.053	.007	.013	.141	.055									
14	56.94	21.03	n. d.	3.41	0.33	1.93	9.05	4.66	2.15	0.39						99.89	
A4. IV	.949	.206	—	.048	.008	.034	.146	.050									
15	56.57	20.74	n. d.	5.66	0.23	1.05	9.36	4.49	1.49	1.11						99.70	
A4. IV	.943	.203	—	.079	.006	.019	.151	.048									
16	55.94	20.91	n. d.	4.50	0.42	1.73	8.87	5.44	2.43	0.31						100.55	
A4. IV	.932	.205	—	.062	.011	.030	.143	.058									
17	58.70	19.26	3.37	0.58	0.76	1.41	8.55	4.53	2.57	0.07		trace	0.10	0.10		100.00	
A2. II	.978	.189	.021	.008	.019	.025	.138	.048				—	.001	.001			
18	60.02	20.98	2.21	0.51	trace	1.18	8.83	5.72	0.70			+	trace	trace		100.15	2.576
A3. III	1.000	.206	.014	.007	—	.021	.142	.061					—	—			13°
19	59.38	19.47	1.60	1.19	0.36	1.96	7.80	5.83	0.69	0.11		0.58	0.08	0.15	0.13	100.05	
A1. I	.990	.191	.010	.017	.009	.035	.126	.062				.007	.001	.002	.001		
20	59.00	20.07	1.58	0.65	0.10	1.05	8.34	5.63	2.03	0.24	0.26	0.29	0.05	0.12	trace	99.92	
A1. I	.983	.197	.010	.009	.003	.019	.135	.060				.004	—	.002	—		
21	58.98	20.54	1.65	0.48	0.11	0.67	9.95	5.31	0.97	0.19		0.24	0.04	0.26	none	100.07 .06	
A1. I	.983	.201	.010	.007	.003	.012	.160	.056				.003	—	.004	—	100.01	
22	58.78	20.03	1.87	0.49	0.16	0.83	9.36	5.50	1.57	0.31		0.29	0.03	0.15	none	100.24 .13	
A1. I	.980	.196	.012	.007	.004	.015	.151	.059				.004	—	.002	—	100.11	
23	58.64	19.62	2.17	0.42	0.37	1.24	8.39	5.26	2.40	0.34	0.23	0.20	0.03	0.20	trace	99.74	2.52
A1. I	.977	.192	.014	.006	.009	.022	.135	.056				.003	—	.003	—		

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBRANG 4. DOSODIC. MIASKOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 28.4 ab 35.6 an 1.7 ne 21.3 C 1.2	ol 6.2	One mile south of Hot Springs, Arkansas.	W. A. Noyes.	J. F. Williams, A. R. Ark. G. S., 1890, II, p. 370, 1891.	Tinguaite.	
		or 32.8 ab 41.4 an 3.1 ne 15.9	di 1.8 mt 1.4 hm 1.3	Black Hills, South Dakota.	H. N. Stokes.	W. Cross, B. U. S. G. S., 148, p. 114, 1897.	Phonolite.	Same as next, No. 9.
ZrO_2 SO_3 Cl S SrO Li_2O	0.15 0.06 0.08 0.03 0.04 trace	or 30.6 ab 39.3 ne 19.0	ac 4.2 wo 1.9 mt 1.2	Black Hills, South Dakota.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 150, p. 193, 1898.	Phonolite.	Same as above, No. 8.
		or 26.7 ab 47.7 an 3.1 ne 13.9 C 0.8	ol 6.7	Squaw Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving. Ann. N. Y. Ac., XII, p. 272, 1899.	Tinguaite.	
		or 28.4 ab 41.9 an 5.6 ne 14.8	di 1.6 ol 6.5	Bald Mountain, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac., XII, p. 272, 1899.	Phonolite.	
		or 22.2 ab 48.2 an 3.9 ne 16.8 C 0.4	ol 5.8	Green Mountain, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac., XII, p. 272, 1899.	Phonolite.	
		or 30.6 ab 39.3 an 1.1 ne 18.7	di 2.3 ol 5.1	Calamity Gulch, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac., XII, p. 272, 1899.	Phonolite.	
		or 27.8 ab 35.6 an 2.8 ne 22.1	di 5.8 ol 3.3	Ragged Top Mountain, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac., XII, p. 272, 1899.	Phonolite.	
		or 26.7 ab 36.7 an 1.1 ne 23.0	di 3.6 ol 7.1	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac., XII, p. 272, 1899.	Phonolite.	
		or 32.2 ab 28.3 an 1.1 ne 25.3	di 6.4 ol 4.6	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac., XII, p. 272, 1899.	Phonolite.	
		or 26.7 ab 48.2 an 0.8 ne 13.1	di 4.5 mt 1.9 hm 2.0	Shield's River, Crazy Mountains, Montana.	W. H. Melville.	Wolff and Tarr, B. M. C. Z., XVI, p. 232, 1893.	Acmite-trachyte.	
Cl	trace	or 33.9 ab 43.0 an 0.8 ne 17.0	wo 2.1 mt 1.6 hm 1.1	Between Florissant and Manitou, El Paso Co., Colorado.	L. G. Eakins.	W. Cross, Pr. Col. Sc. Soc., II, p. 169, 1887.	Phonolite.	Also in 16 A. R. U.S.G.S., II, p. 39, 1895.
ZrO_2 SO_3 Cl SrO Li_2O	0.10 0.37 0.22 0.03 trace	or 34.6 ab 43.0 an 0.8 ne 4.8 so 3.0 no 3.6	di 3.7 wo 1.9 mt 2.3 il 1.1	Bull Cliff, Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, 16 A. R. U. S. G. S., II, p. 43, 1895.	Trachytic-phonolite.	
ZrO_2 SO_3 Cl SrO Li_2O	0.20 0.07 0.24 none trace	or 33.4 ab 44.0 an 0.6 ne 10.5 so 3.3	di 0.7 wo 1.6 mt 2.3	Big Bull Mountain, Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, 16 A. R. U. S. G. S., II, p. 39, 1895.	Phonolite.	
ZrO_2 SO_3 Cl SrO Li_2O	0.20 0.20 0.28 none trace	or 31.1 ab 38.3 ne 17.2 so 3.9	ac 4.6 di 2.6	Mitre Peak, Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, 16 A. R. U. S. G. S., II, p. 39, 1895.	Phonolite.	
ZrO_2 SO_3 Cl SrO Li_2O	0.17 0.12 0.58 none trace	or 32.8 ab 40.3 ne 10.2 so 8.0	di 1.2 wo 1.2 mt 1.4 il 0.6	Near Straub Mountain, Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, 16 A. R. U. S. G. S., II, p. 39, 1895.	Phonolite.	
ZrO_2 SO_3 Cl SrO Li_2O	0.09 trace? 0.14 trace trace	or 31.1 ab 44.5 ne 14.2	di 2.0 wo 1.5 mt 1.4 hm 1.3	Rhyolite Mountain, Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, 16 A. R. U. S. G. S., II, p. 39, 1895.	Phonolite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. MIASKASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
24	56.24	21.43	2.01	0.55	0.15	1.38	10.53	5.74	0.86	0.12		0.26	0.06	0.08	0.08	99.86	2.619
A1. I	.937	.210	.013	.008	.004	.025	.170	.061				.003	—	.001	.001		22°
25	58.40	20.25	1.78	2.41	0.49	3.11	7.01	5.39	0.57	0.27	none	0.25	0.20	trace	trace	100.21	
A1. I	.973	.198	.011	.033	.012	.056	.113	.057				.003	.001	—	—		
26	52.83	20.70	2.84	1.19	0.41	1.00	9.94	4.87	5.13	0.37	0.15	0.16	0.03	trace		99.68	
A1. I	.880	.203	.018	.017	.010	.018	.160	.052				.002	—	—			
27	53.10	22.50	5.10	n. d.	0.15	2.15	8.49	6.48	1.65							100.43	
A4. IV	.885	.221	.032	(.064)	.004	.038	.137	.069									
28	52.75	22.55	3.65	n. d.	0.15	1.85	8.10	7.05	3.60							99.70	
A4. IV	.879	.221	.022	(.044)	.004	.033	.131	.075									
29	60.84	20.03	1.47	0.42	0.45	1.56	9.12	4.48	1.15		0.11					99.64	2.683
A3. III	1.014	.196	.009	.005	.011	.028	.147	.047									
30	56.67	22.42	1.82	0.80	1.33	0.28	8.52	7.32	1.18			0.24	0.01	trace		100.59	
A2. II	.945	.220	.011	.011	.033	.005	.137	.078				.003	—	—			
31	53.96	21.78	0.62	2.55	0.54	1.93	8.61	7.02	2.29			1.03	trace	0.15		100.48	2.578
A2. II	.899	.214	.004	.035	.014	.034	.139	.075				.012	—	.002			18°.
32	54.20	21.74	0.46	2.36	0.52	1.95	8.69	6.97	2.32			1.04	trace	0.11		100.36	2.578
A2. II	.903	.213	.003	.033	.013	.035	.140	.074				.012	—	.002			18°.55
33	53.71	21.82	0.78	2.47	0.56	1.90	8.52	7.07	2.27			1.03	trace	0.19		100.32	2.578
A2. II	.895	.214	.005	.035	.014	.034	.137	.075				.012	—	.003			18°.5
34	55.93	21.83	3.62	0.34	0.61	2.54	7.84	6.01	0.72		0.03	0.42	0.22			100.70	2.62
A2. II	.932	.214	.023	.005	.015	.045	.127	.064				.005	.001				
35	61.03	18.63	3.66	n. d.	1.04	1.56	7.68	5.57	0.41							99.58	
A4. IV	1.017	.183	.023	(.046)	.026	.028	.124	.059									
36	58.61	21.12	2.62	1.14	0.79	0.62	7.85	5.93	1.01			1.10	trace	trace		100.79	
A3. III	.977	.207	.016	.017	.020	.011	.127	.063				.013	—	—			
37	56.40	21.36	2.96	2.39	0.90	1.81	8.57	4.83	0.01			0.84		0.49		100.56	
A2. II	.940	.209	.018	.033	.023	.032	.138	.051				.010		.007			
38	56.26	23.59	0.85	2.61	0.27	0.54	7.77	5.72	0.37		1.37	0.47		0.09		99.91	
A2. II	.938	.231	.005	.036	.007	.009	.126	.061				.006		.001			
39	53.45	21.28	4.08	n. d.	0.18	1.30	8.37	5.98	5.20							99.95	
A4. IV	.891	.208	.026	(.052)	.005	.023	.135	.064									
40	56.43	20.58	2.88	1.28	0.28	1.45	8.62	4.23	2.90			n.d.	0.06	0.66		99.58	2.499
A2. II	.941	.202	.018	.018	.007	.026	.139	.045				—	—	.009			
41	55.92	20.35	2.16	0.94	0.62	2.21	8.35	4.83	3.51			trace	0.18	0.50		100.04	2.452
A1. I	.932	.200	.014	.013	.016	.039	.135	.052				—	.001	.007			

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBRANG 4. DOSODIC. MIASKOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 SO_3 Cl S SrO	0.09 0.10 0.12 0.03 0.03	or 33.9 ab 22.0 ne 32.7	ac 6.0 di 2.9 wo 1.5	Pleasant Valley, Colfax County, New Mexico.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 171, 1900.	Phonolite.	No Cr_2O_3 or NiO.
ZrO_2 SO_3 Cl	none 0.06 0.02	or 31.7 ab 37.7 an 7.8 ne 11.6	di 6.7 ol 0.5 mt 2.9	San José, Tamaulipas, Mexico.	H. S. Washington.	H. S. Washington, Priv. contrib.	Nephelite-syenite.	Error, should be viezzenose.
SO_3 Cl	trace 0.06	or 28.9 ab 25.7 ne 29.0	ac 4.2 di 4.2 mt 2.1	San José, Tamaulipas, Mexico.	H. S. Washington.	H. S. Washington, Priv. contrib.	Tinguaite.	
		or 38.4 ab 13.1 an 4.2 ne 31.8	di 5.7 ol 4.5	Pocos de Caldas, Minas Geraes, Brazil.	J. Machado.	J. Machado, T. M. P. M., IX, p. 345, 1888.	Nephelite-syenite.	
		or 41.7 ab 11.5 an 4.2 ne 31.0	di 4.4 ol 3.1	Pocos de Caldas, Minas Geraes, Brazil.	J. Machado.	J. Machado. T. M. P. M., IX, p. 334, 1888.	Nephelite-syenite.	
SO_3	0.06	or 26.1 ab 51.9 an 0.6 ne 13.6	di 2.3 wo 1.7 mt 1.2 hm 0.6	Dunmoor Hill, Cheviot Hills, Scotland.	I. Macadam.	H. Kynaston, Tr. Edin. G. Soc. VII, p. 401, 1899.	Biotite-porphyrite.	
Cl	trace	or 43.4 ab 23.1 an 1.4 ne 26.4	ol 2.3 mt 1.9 il 0.5 hm 0.5	Between Monchique and Caldas, Serra de Monchique, Portugal.	O. N. Heidenreich.	Kraatz-Koschlau and Hackman, T. M. P. M., XVI, p. 228, 1896.	Nephelite-syenite.	
Cl S SrO Li_2O	trace trace trace trace	or 41.7 ab 13.6 an 0.3 ne 32.1	di 7.8 mt 0.9 il 1.8	Picota, Serra de Monchique, Portugal.	P. Jannasch.	P. Jannasch, N. J. 1884, II, p. 13.	Nephelite-syenite.	Mean of next two.
Cl S SrO Li_2O	trace trace trace trace	or 41.1 ab 14.7 ne 31.8	di 7.8 mt 0.7 il 1.8	Picota, Serra de Monchique, Portugal.	P. Jannasch.	P. Jannasch, N. J. 1884, II, p. 13.	Nephelite-syenite.	Same specimen as No. 33 below.
Cl S SrO Li_2O	trace trace trace trace	or 41.7 ab 13.6 an 0.6 ne 31.5	di 7.5 mt 1.2 il 1.8	Picota, Serra de Monchique, Portugal.	P. Jannasch.	P. Jannasch, N. J. 1884, II, p. 13.	Nephelite-syenite.	Same specimen as No. 32 above.
SO_3 Cl.	0.08 0.51	or 35.6 ab 29.3 an 6.4 ne 12.2 so 6.8	di 3.7 wo 0.6 mt 1.2 il 0.8 hm 2.9	Forodada, Columbretes Islands, Spain.	R. Pfohl.	F. Becke, T. M. P. M., XVI, p. 165, 1896.	Trachytic phonolite.	
		or 32.8 ab 44.0 ne 11.4	di 6.7 ol 3.9	Aueröd, n. Holmestrand, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 57, 1890.	Quartz-syenite-porphyry.	Near nordmarkose. Alkalies high?
		or 35.0 ab 40.9 an 3.1 ne 13.9 C 0.6	ol 1.4 mt 0.9 il 2.0 hm 1.9	Heum, Laugendal, Norway.	O. N. Heidenreich.	W. C. Brögger, Eg. Kg., III, p. 176, 1899.	Ægirine-katoforite-foyaite.	Cf. remarks, p. 181, loc. cit.
		or 28.4 ab 37.7 an 5.6 ne 18.7	di 2.8 ol 1.1 mt 4.2 il 1.5	Poutelitschorr, Kola Penins., Finland.	F. Eichleiter.	F. Eichleiter, Vh. Wien. G. R-A., XXVII, p. 218, 1893.	Nephelite-syenite.	Cf. Hackman, Fennia, XI, p. 139, 1894.
		or 33.9 ab 37.2 an 2.5 ne 15.6 C 3.6	ol 3.2 mt 1.2 il 0.9	Mt. Sobatchia, Ural Mts., Siberia.	Bourdakow.	A. Karpinsky. Guide Exc., VII. Cong. G. Int., V, p. 22, 1897.	Miascite.	
SO_3 Cl	0.17 trace	or 35.6 ab 22.5 an 2.5 ne 26.1	di 3.3 ol 4.2	Engelerkopf, Laacher See, Rh. Prussia.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn, XLVIII, p. 236, 1891.	Leucite-phonolite.	
SO_2 Cl F	0.22 0.07 trace	or 25.0 ab 45.1 an 5.0 ne 15.1	di 1.7 mt 4.2	Mägdeberg, Hegau, Germany.	G. F. Föhr.	G. F. Föhr, In. Diss. Wurzburg, 1883, p. 32.	Phonolite.	TiO_2 in SiO_2
SO_3 Cl F Cr_2O_3 Cu	0.23 0.06 trace trace 0.18	or 28.9 ab 35.6 an 3.6 ne 19.0	di 3.4 wo 2.3 mt 3.2	Staufen, Hegau, Germany.	G. F. Föhr.	G. F. Föhr, In. Diss. Wurzburg, 1883, p. 28.	Phonolite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. MIASKASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
42	55.01	21.67	1.95	1.86	0.13	2.12	9.78	3.54	2.17			0.27	0.08	0.22		99.41	2.513
A1. I	.917	.212	.012	.026	.003	.038	.158	.037				.003	.001	.003			
43	56.49	18.77	3.00	1.46	0.63	3.29	7.10	5.18	1.83	0.62	1.00	0.74	0.27	0.32		100.70	2.517
A2. II	.942	.184	.019	.020	.016	.058	.114	.056				.009	.002	.005			
44	58.33	19.31	3.77	0.69	0.27	1.15	8.93	5.08	2.39		0.04	0.13	0.02			100.23	2.580
A2. II	.972	.189	.024	.010	.007	.021	.143	.055				.002	—				
45	55.46	24.49	2.63	1.06	0.05	0.92	9.78	5.16	0.07			0.20	trace	trace		99.82	
A2. II	.924	.240	.016	.015	.001	.016	.158	.056				.003	—	—			
46	53.58	25.26	0.64	1.20	0.08	1.20	10.49	5.28	0.04		0.79	0.27	trace			99.33	
B2. III	.893	.247	.004	.017	.002	.021	.169	.057				.003	—				

RANG 1. PERALKALIC. MIASKASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	58.34	23.05	2.07	n. d.	trace	0.50	12.22	1.79	1.53			0.35		trace	0.66	100.51	
A3. III	.972	2.26	.013	(.026)	—	.009	.197	.019				.004		—	.004		
2	60.29	21.39	3.07	n. d.	trace	0.46	12.30	trace	0.67							98.18	
D4. V	1.005	.210	.020	(.040)	—	.008	.198	—									

RANG 2. DOMALKALIC. VIEZZENASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	53.76	23.21	1.27	3.18	0.23	2.94	6.97	7.01	1.71			none	trace	none		100.34	
A2. II	.896	.227	.008	.044	.006	.052	.113	.074				—	—	—			

RANG 2. DOMALKALIC. VIEZZENASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	54.68	21.63	2.22	2.00	1.25	2.86	7.03	4.58	1.88	0.27	none	0.79	0.28	trace	0.05	99.81 .09	
A1. I	.911	.212	.014	.028	.031	.051	.113	.049				.010	.002	—	—	99.72	
2	55.62	20.46	n. d.	4.06	0.62	1.91	7.64	4.38	4.22	0.57						99.48	
A4. IV	.927	.200	—	.057	.016	.034	.123	.047									
3	54.71	22.07	2.49	2.50	0.88	2.52	7.58	5.46	1.13	0.20						99.54	
A8. III	.912	.216	.016	.035	.022	.045	.122	.059									
4	54.61	22.07	2.33	2.50	0.88	2.51	7.58	5.46	1.13	—		0.09	0.15	trace		99.31	
B2. III	.910	.216	.015	.035	.022	.045	.122	.059				.001	.001	—			
5	56.71	22.49	3.40	n. d.	1.19	2.22	7.37	5.87	0.45							99.70	
A4. IV	.945	.220	.021	(.042)	.030	.039	.119	.063									
6	56.04	22.15	1.06	3.28	1.12	2.42	8.39	5.03	0.67							100.16	
A3. III	.934	.217	.007	.046	.028	.043	.135	.054									

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBRANG 4. DOSODIC. MIASKOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 Cl F Cr_2O_3 Cu	0.41 0.08 trace trace 0.12	or 20.6 ab 40.9 an 6.1 ne 18.5 no 2.6	di 3.4 wo 0.8 mt 2.8 il 0.5	Hohentwiel, Hegau, Germany.	G. F. Föhr.	G. F. Föhr, In. Diss. Wurzburg, 1883, p. 28.	Phonolite.	
		or 31.1 ab 38.8 an 3.9 ne 11.6	di 3.4 wo 3.3 mt 2.6 il 1.4 hm 1.3	Ziegenberg, n. Nestersitz, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIV, p. 97, 1894.	Trachytic phonolite.	Near nordmarkose and essexose.
SO_3	0.12	or 30.6 ab 41.4 ne 15.1	ac 4.2 di 1.5 wo 1.6 mt 2.3 hm 0.8	Nagy-Köves, Fünfkirchen, Hungary.	K. Gremse.	K. A. Lossen, Z. D. G. G., XXXIX, p. 507, 1887.	Phonolite.	
		or 31.1 ab 31.4 an 4.4 ne 27.8 C 1.0	mt 3.7	Gy. Szt. Miklos, Czanod, Siebenbürgen, Hungary.	J. v. Szadeczky.	J. v. Szadeczky, Cf. N. J., 1901, I, p. 402.	Tinguaite.	
Cl	0.50	or 31.7 ab 23.1 an 5.8 ne 27.5 so 6.9 C 0.7	ol 1.5 mt 0.9	Ditro, Siebenbürgen, Hungary.	J. v. Szadeczky.	J. v. Szadeczky, Cf. N. J., 1901, I, p. 402.	Nephelite-syenite.	Sum low.

SUBRANG 5. PERSODIC. MARIUPOLOSE.

		or 10.6 ab 56.6 an 2.5 ne 25.3	ol 2.7	Degenmatt, Kaiserstuhl, Baden.	A. Cathrein.	A. Knop, Der Kaiserstuhl, Leipzig, 1892, p. 209.	Phonolite.	Alkalies interchanged in original?
		ab 74.9 an 2.2 ne 15.6 C 0.4	ol 4.1	Kaltschik River, Mariupol, Russia.	Nikolajew.	P. Jeremejeff, B. Ac. Sc. St. Petersb., VII, p. 89, 1897.	Nephelite-syenite.	Cf. N. J. 1900, I, p. 395. cf. No. 3, tuolumnose.

SUBRANG 3. SODIPOTASSIC.

Cl SrO Li_2O	0.02 0.04 trace	or 41.1 ab 14.1 an 11.1 ne 24.4	di 2.7 ol 3.1 mt 1.9	"The Ridge," Magnet Cove, Arkansas.	J. F. Williams.	J. F. Williams, A. R. Ark. G. S., 1890, II, p. 266, 1891.	Tinguaite-porphyry.	

SUBRANG 4. DOSODIC. VIEZZENOSE.

SO_3 Cl F	0.07 none 0.22	or 27.2 ab 35.6 an 14.2 ne 12.8	ol 2.6 mt 3.2 il 1.5	Brookville, New Jersey.	G. Steiger.	F. L. Ransome, A. J. S., VIII, p. 423, 1899.	Nephelite-syenite.	
		or 26.1 ab 38.8 an 8.3 ne 13.9	di 1.0 ol 6.5	Preston, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac., XII, p. 272, 1899.	Tinguaite.	
Cl	trace	or 32.8 ab 27.2 an 9.2 ne 19.9	di 2.8 ol 2.5 mt 3.7	Serra de Monchique, Portugal.	A. Kalecsinzky.	A. Kalecsinzky, F. K., XV, p. 344, 1885.	Nephelite-syenite.	Same as No. 4 below.
Cl	trace	or 32.8 ab 25.7 an 9.7 ne 20.7	di 4.6 ol 1.9 mt 3.5	Barranco do Banho, Serra de Monchique, Portugal.	A. Kalecsinzky.	A. Merian, N. J. B. B., III, p. 271, 1885.	Nephelite-syenite.	Same as No. 3 above. TiO_2 from SiO_2 P_2O_5 wrongly from Fe_2O_3.
		or 25.0 ab 28.3 an 10.8 ne 18.5	ol 6.4	Bratholmen, Christiania Fjord, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 38, 1890.	Ditroite.	
		or 30.0 ab 29.9 an 7.8 ne 22.2	di 3.6 ol 4.6 mt 1.6	Vasvik Tunnel, Laurvik, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 38, 1890.	Nephelite-rhomben-porphyry.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. VIEZZENASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
7	54.46	19.96	2.34	3.33	0.61	2.12	8.68	2.76	5.20			trace		trace		99.46	
A3. III	.908	.196	.015	.046	.015	.038	.140	.030				—		—			
8	57.40	23.09	1.94	n. d.	0.13	1.66	8.12	5.70	1.18		trace	0.41		trace		100.20	
A3. III	.957	.226	.013	(.026)	.003	.030	.130	.061				.005		—			
9	55.19	23.02	1.23	n. d.	trace	2.70	9.95	4.48	0.52		none	0.63				100.42	
B3. IV	.920	.225	.017	(.034)	—	.048	.160	.048				.008					
10	57.20	20.04	2.90	1.20	0.40	3.19	7.85	4.12	2.20			trace	0.22	trace		99.42	2.578
B2. III	.953	.196	.018	.017	.010	.057	.127	.043				—	.002	—			

CLASS I. PERSALANE.

RANG 1. PERALKALIC. LAUGENASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	53.54	24.27	1.11	1.24	0.08	0.71	8.62	8.87	1.09	0.14	0.20					99.87	
A3. III	.892	.238	.007	.017	.002	.012	.139	.094									

RANG 1. PERALKALIC. LAUGENASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	55.50	22.45	1.03	1.32	0.47	1.60	10.74	5.48	0.96			0.50	trace			100.05	
A2. II	.925	.220	.006	.018	.012	0.29	.173	.058				.006	—				
2	50.99	24.66	2.33	2.21	1.54	2.13	11.36	4.39	0.63							100.24	
A3. III	.850	.242	.015	.031	.039	.038	.185	.047									

CLASS I. PERSALANE.

SECTION 1. C EXTREME OVER Z.

RANG 1. PERALKALIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	72.66	18.98	0.57	0.21	0.47	0.03	0.21	5.91	0.86							99.94	
A3. III	1.211	.186	.004	.003	.012	—	.003	.063									

SECTION 1. C EXTREME OVER Z.

RANG 3. ALKALICALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	66.02	21.43	4.62	0.63	1.77	1.81	0.15	3.17	0.16		0.08					99.88	
A3. III	1.100	.210	.029	.008	.044	.032	.002	.034									

SECTION 1. C EXTREME OVER Z.

RANG 2. DOMALKALIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	54.41	27.04	1.88	0.11	0.51	2.00	1.14	6.71	3.36		1.22	0.54	0.08			99.37	2.754
B2. III	.907	.265	.012	.001	.013	.036	.018	.071				.008	.001				

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBRANG 4. DOSODIC. VIEZZENOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 16.7 di 2.8 ab 46.6 ol 3.2 an 7.2 mt 3.5 ne 14.5	Njurjavrpachk, Umptek, Kola, Finland.	K. Kjellin.	V. Hackman, Fennia, XI, p. 158, 1894.	Tinguaite.	
SO_3 0.57	or 33.9 ol 2.3 ab 35.6 il 0.8 an 8.3 ne 11.6 no 5.0 C 1.2	Laacher See, Rh. Prussia.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn, XLVIII, p. 298, 1891.	Trachyte.	
SO_3 2.70	Q 2.8 di 1.7 or 26.7 hy 2.5 ab 30.4 il 1.2 an 11.4 no 24.2	Laacher See, Rh. Prussia.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn, XLVIII, p. 317, 1891.	Nosean-sanidinite.	
SO_3 trace Cl 0.10	or 23.9 di 2.2 ab 45.6 wo 2.5 an 7.2 mt 4.0 ne 11.4	Viezzena Valley, Predazzo, Tyrol.	M. Dittrich.	Osann and Hlawatsch, T. M. P. M., XVII, p. 560, 1898.	Nephelite-syenite-porphyry.	

ORDER 7. LENFELIC. TASMANARE.

SUBRANG 3. SODIPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 52.2 di 1.5 ab 3.1 ol 0.8 an 1.4 mt 1.6 ne 37.8	Near J. M. Henry No. 2, Magnet Cove, Arkansas.	H. S. Washington.	H. S. Washington, J. G., IX, p. 667, 1901.	Foyaite.	

SUBRANG 4. DOSODIC. LAUGENOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 32.2 ac 2.8 ab 21.0 di 6.9 ne 36.0	Brathagen, Laugendal, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 41, 1890.	Foyaite.	Also in Eg. Kg., III, p. 176, 1898.
	or 26.1 di 6.4 ab 14.5 ol 2.2 an 2.8 mt 3.5 ne 44.9	Laugendal, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 41, 1890.	Nephelite-porphyry.	Loose block. Cf. Eg. Kg., III, p. 158, 1898.

SUBCLASS II. Q+F+L DOMINANT OVER C+Z.

ORDER 3. QUARFELIC.

SUBRANG 1. PERPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.02	Q 48.2 hy 1.2 or 35.0 mt 0.8 ab 1.6 C 12.2	Near Linhope, Cheviot Hills, Scotland.	I. Macadam.	H. Kynaston, Tr. G. Soc. Edin., VII, p. 410, 1899.	Quartz-felsite.	

ORDER 3. QUARFELIC—Continued.

SUBRANG 1. PERPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.04	Q 46.6 hy 4.4 or 18.9 mt 1.9 ab 1.0 hm 3.3 an 8.9 C 14.5	Black Lynn, Cheviot Hills, Scotland.	I. Macadam.	H. Kynaston, Tr. G. Soc. Edin., VII, p. 394, 1899.	Granite.	

ORDER 4. QUARDOFELIC.

SUBRANG 2. DOPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.29 Org 0.10	Q 17.3 hy 1.3 or 39.5 mt 0.2 ab 9.4 hm 1.6 an 10.0 C 14.0	Near Wibbecke, Westphalia.	Jacobs.	O. Mügge, N. J. B. B., VIII, p. 632, 1893.	Quartz-keratophyre.	Sum low. Not fresh.

CLASS I. PERSALANE—Continued.

SECTION 1. C EXTREME OVER Z.

RANG 1. PERALKALIC. URALASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	52.34	16.05	0.45	n. d.	0.16	0.20	4.77	6.58	0.40							99.50	
A3. III	.872	.157	.003	(.006)	.004	.004	.077	.070									
2	40.06	13.65	0.35	n. d.	0.15	0.30	3.71	5.20	0.46							99.28	
B3. IV	.668	.134	.002	(.004)	.004	.005	.060	.055									

CLASS I. PERSALANE.

SECTION 1. C EXTREME OVER Z.

RANG 4. DOCALCIC. BORSOWASE.

1	22.52	16.31	2.20	n. d.	1.34	6.64	1.00	0.58	1.58							99.40	3.240
B3. IV	.375	.160	.014	(.028)	.034	.118	.016	.006									22°

RANG 5. PERCALCIC. KYSCHTYMASE.

1	16.80	13.89	0.76	n. d.	0.61	7.26	0.38	0.13	0.76							100.10	
A3. III	.280	.136	.005	(.010)	.015	.129	.006	.001									

SUBCLASS II. Q+F+L DOMINANT OVER C+Z—Continued.

ORDER 5. PERFELIC. INDARE.

SUBRANG 3. SODIPOTASSIC. URALOSE.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Corundum 18.55	or 38.9 ab 37.2 an 1.1 ne 1.7 C 19.2	ol 0.9	Nikolskaja Ssopka, Ural Mountains, Siberia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XVIII, p. 219, 1898.	Corundum-syenite.	
Corundum 35.40	or 30.6 ab 27.2 an 1.4 ne 2.3 C 36.8	ol 0.7	Ilmen Mountains, Ural Mountains, Siberia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XVIII, p. 219, 1898.	Corundum-pegmatite.	

SUBCLASS III. Q+F+L EQUAL TO C+Z.

ORDER 5. PERFELIC. SIBERARE.

SUBRANG 3. PRESODIC. BORSOWOSE.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Corundum 47.51	or 3.3 ab 5.2 an 32.8 ne 1.7 C 49.5	ol 5.2	Borsowska, Ural Mountains, Siberia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XVIII, p. 212, 1898.	Kyschtymite.	Near kyschtymase.

SUBRANG. NOT NEEDED.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Corundum 59.51	or 0.6 an 35.9 ne 1.7 C 59.5	ol 2.0	Borsowska, Ural Mountains, Siberia?	J. Morozewicz.	J. Morozewicz, T. M. P. M., XVIII, p. 212, 1898.	Kyschtymite.	Corundum includes spinel.

CLASS II. DOSALANE.

RANG 1. PERALKALIC. VARINGASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	75.40	7.72	1.41	n. d.	1.26	1.55	8.09	4.52	0.43					0.12		100.62	2.39
A3. III	1.257	.076	.009	—	.032	.028	.130	.048						.002			
2	74.15	10.07	0.86	none	0.30	1.28	6.64	4.44	0.71	—	trace	0 93	0.09	0.26	0.04	99.96	
A1 I	1.236	.099	.005	—	.008	.023	.107	.047				.011	.001	.004	—		
3	74.35	8.73	5.84	1.00	0.07	0.45	4.51	3.96	0.25					0.22		99.38	
A3. III	1.239	.086	.037	.014	.002	.008	.073	.042						.003			
4	70.30	6.32	9.23	1.40	0.89	0.84	7.70	2.50	0.82							100.00	2.69
A3. III	1.172	.062	.057	.019	.022	.015	.124	.026									

RANG 1. PERALKALIC. VARINGASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	63.66	7.81	8.13	3.61	1.85	2.56	3.02	2.45	2.94		3.04		0.31	0.54		99.92	
A3. III	1.061	.076	.051	.050	.046	.046	.048	.026					.002	.008			
2	72.12	9.75	4.11	3.22	trace	2.99	3.42	2.76	0.10	—				1.83		100.30	2.706
B3. IV	1.202	.096	.026	.044	—	.053	.055	.030						.023			20.4°

RANG 2. DOMALKALIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	66.44	17.43	2.10	1.60	3.70	0.65	0.99	4.76	2.13		0.10		trace			99.90	
A3. III	1.107	.171	.013	.022	.093	.012	.016	.051					—				

RANG 2. DOMALKALIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	69.27	12.56	2.89	4.51	0.91	1.44	3.12	3.05	0.76			0.78	0.06	trace		99.35	2.724
B2. III	1.155	.123	.018	.062	.023	.026	.050	.033				.010	—	—			
2	64.23	14.88	8.46	0.44	2.35	1.85	2.11	3.01	3.19							100.52	2.56
A3. III	1.071	.146	.053	.006	.059	.033	.034	.032									

RANG 2. DOMALKALIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	71.24	12.20	1.71	5.44	0.13	0.98	4.29	1.86	0.81					0.97		99.63	
A3. III	1.187	.120	.011	.075	.003	.018	.069	.020						.014			

RANG 3. ALKALICALCIC. ALMERASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	63.75	17.62	3.00	3.26	3.41	2.50	1.75	2.40	2.77							100.45	
A3. III	1.063	.172	.019	.045	.085	.045	.030	.025									

RANG 3. ALKALICALCIC. ALMERASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	65.94	13.74	0.49	5.21	2.33	2.87	2.80	1.63	2.59	0.21	0.59	0.80	0.21	0.11	0.12	100.25	
A1. I	1.099	.134	.003	.072	.058	.051	.045	.018				.010	.001	.002	.001		

SUBCLASS I. Q+F+L EXTREME OVER C+Z.

ORDER 3. QUARFELIC. HISPANARE.

SUBRANG 3. SODIPOTASSIC. VARINGOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl	0.12	Q 36.7 or 26.7 ab 14.7	ac 14.2 ns 11.4 di 6.0 hy 0.4	S. of Borax Lake, California.	W. H. Melville.	G. F. Becker, M. XIII, U. S. G. S. p. 159, 1888.	Rhyolite-obsidian.	
ZrO_2 Cl FeS_2 CoO CuO Pb	none 0.13 trace none 0.06 none	Q 32.5 or 26.1 ab 27.2	ac 2.3 ns 6.1 di 1.7 wo 0.4 tn 2.2	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Private contribution.	Aplite.	Dried at 100°. Near grorudose.
		Q 35.5 or 23.4 ab 23.1	ac 13.4 di 2.6 mt 1.9	Varingskollen, n. Hakedalen, Norway.	G. Särnströn.	W. C. Brögger, Z. K., XVI, p. 66, 1890.	Grorudite.	Also in Eg. Kg., I, p. 48, 1894.
		Q 29.1 or 14.5 ab 18.9	ac 26.2 ns 3.9 di 3.5 hy 3.1	Khagiar, Cuddia Nera, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 173, 1884.	Pantellerite.	

SUBRANG 4. DOSODIC.

		Q 31.4 or 14.5 ab 25.2 an 0.6	di 9.8 mt 11.7	Near Roztok, Moldauthal, Bohemia.	Strnad.	J. Klvana, cf. N. J., 1898, I, p. 485.	Quartz-diorite (syenitic).	Not fresh.
		Q 36.5 or 16.7 ab 28.8 an 3.1	di 4.8 wo 2.7 mt 5.8	Two Mile Flat, Cudgegong River, New South Wales.	A. Liversidge.	A. Liversidge, J. R. Soc., N. S. W., XVI, p. 44, 1883.	Felsite.	Dried at 100°. MnO high.

SUBRANG 2. DOPOTASSIC.

SnO_2	trace	Q 34.7 or 28.4 ab 8.4 an 3.3 C 9.4	hy 10.5 mt 3.0	Tamaya, Chile.	C. Schwarz.	v. Groddeck, Z. D. G. G., XXXIX, p. 252, 1887.	Dike rock.	

SUBRANG 3. SODIPOTASSIC.

		Q 32.8 or 18.3 ab 26.2 an 7.2 C 1.4	hy 6.9 mt 4.2 il 1.5	Sudbury, Ontario.	T. L. Walker?	T. L. Walker, Q. J. G. S., LIII, p. 56, 1897.	Granite.	Sum low.
		Q 33.0 or 17.8 ab 17.8 an 9.2 C 4.8	hy 5.9 mt 1.4 hm 7.5	Wildsruff, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII. p. 749, 1886.	Mica-porphyrite.	Fe_2O_3 high? FeO low? Al_2O_3 high?

SUBRANG 4. DOSODIC.

		Q 32.2 or 11.1 ab 36.2 an 5.0 C 1.3	di 10.6 mt 2.6	Baraboo Bluffs, Wisconsin.	W. Daniels.	S. Weidmann, B. Un. Wisc., Sc. Ser. I, p. 47, 1895.	Quartz-keratophyre.	MnO high?

SUBRANG 3. SODIPOTASSIC. ALMEROSE.

		Q 31.9 or 13.9 ab 15.7 an 12.5 C 7.4	hy 12.0 mt 4.4	Hoyazo, Cabo de Gata, Almeria, Spain.	J. Savelsberg.	A. Osann, Z. D. G. G., XL, p. 701, 1888.	Cordierite-andesite.	

SUBRANG 4. DOSODIC. SITKOSE.

FeS_2 NiO SrO Li_2O Org.	0.41 trace trace trace 0.20	Q 30.1 or 10.0 ab 23.6 an 14.2 C 2.0	hy 13.6 mt 0.7 il 1.5	Indian River, Sitka, Alaska.	W. F. Hillebrand.	G. F. Becker, 18 A. R. U. S. G. S. III, p. 45, 1898.	Diorite.	

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum.	Sp. gr.
1	64.38	14.09	6.10	3.68	2.04	4.51	0.55	3.72	0.82					0.33		100.22	
A3. III	1.073	.138	.038	.051	.051	.080	.009	.039						.005			

RANG 4. DOCALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum.	Sp. gr.
1	63.05	14.31	1.32	6.65	4.38	3.91	2.06	0.82	2.54							100.20	
A3. III	1.051	.140	.008	.093	.110	.070	.033	.009									
2	55.39	16.81	9.87	2.60	3.22	6.03	0.83	0.62	1.07		0.93	2.19	0.69			100.25	2.78
A?2. II?G?	.923	.165	.062	.036	.081	.107	.013	.006				.026	.005				

RANG 5. PERCALCIC. GORDONASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum.	Sp. gr.
1	69.87	12.02	1.42	3.49	2.30	7.86	0.66	0.11	0.89	0.18	0.43	0.69	0.17	0.16	none	100.25	
A1. I	1.165	.118	.009	.049	.058	.140	.010	.001				.009	.001	.002	—		

CLASS II. DOSALANE.

RANG 1. PERALKALIC. PANTELLERASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum.	Sp. gr.
1	71.10	11.39	5.33	n. d.	1.54	0.08	3.95	6.37	0.44			0.57	0.05			100.82	
B2. III	1.185	.112	.033	(.031)	.039	.001	.064	.067				.007	—				
2	70.15	10.60	5.77	1.74	0.35	0.72	5.30	4.09	trace			0.65		0.52		99.89	
A2. II	1.169	.104	.036	.024	.009	.013	.085	.043				.008		.007			
3	66.50	10.90	9.85	2.34	0.60	0.64	5.56	4.54	0.20			trace	trace	trace		101.23	
B2. IV	1.108	.107	.062	.033	.015	.011	.090	.048				—	—	—			
4	61.83	14.80	1.83	5.31	2.69	0.73	3.57	4.54	2.49		0.08	1.17	0.23			99.55	2.656
A2. II	1.031	.145	.011	.074	.067	.012	.058	.048				.014	.002				
5	66.10	13.45	6.30	0.45	0.92	0.60	5.42	5.04	2.10							100.38	
A3. III	1.120	.132	.039	.006	.023	.011	.087	.054									
6	69.61	8.02	7.17	2.83	0.65	0.88	7.47	2.88	0.74							100.25	2.44
A3. III	1.160	.078	.045	.039	.016	.016	.120	.031									
7	69.02	10.09	4.42	4.56	0.76	1.45	6.29	3.70	n. d.							100.58	2.46
A3. III	1.150	.099	.027	.063	.019	.026	.101	.039									

RANG 1. PERALKALIC. PANTELLERASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum.	Sp. gr.
1	63.56	11.72	4.90	1.10	3.65	4.12	6.44	2.30	0.81	—	0.79	0.18	trace	0.24	0.01	99.99	
A1. I	1.059	.115	.030	.015	.091	.073	.104	.024				.002	—	.003	—		
2	66.73	12.23	1.31	4.18	1.49	3.25	6.14	2.53	0.62	0.05		0.32	0.22			99.46	
A2. II	1.112	.120	.008	.058	.037	.058	.099	.026				.004	.002				
3	67.89	11.53	4.51	4.52	0.62	1.51	5.79	3.71	0.33							100.41	2.43
A3. III	1.132	.113	.028	.062	.016	.027	.093	.039									
4	67.48	9.70	7.42	2.21	0.77	1.45	7.21	2.94	0.96							100.14	2.68
A3. III	1.125	.095	.046	.030	.019	.026	.116	.031									

ORDER 3 QUARFELIC. HISPANARE—Continued.

SUBRANG 1. PREPOTASSIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 33.7 or 21.7 ab 4.7 an 22.2 C 1.0	hy 6.8 mt 8.8	Brockenrod, Hesse.	F. Kutscher.	C. Chelius, Erl. G. Kt., Hesse, V., Bl. Breusbach, p. 24, 1897.	Granite.	

SUBRANG 3. PRESODIC.

SnO_2 CuO	0.22 0.94	Q 27.8 or 5.0 ab 17.3 an 19.5 C 2.9	hy 22.2 mt 1.9	Burgstein, n. Kleinwenden, Erzgebirge, Saxony.	Hilger.	F. v. Sandberger, Sb. Münch. A. K., XVIII, p. 444, 1888.	Gabbro.	Not fresh.
		Q 32.6 or 3.3 ab 6.8 an 25.6 C 5.5	hy 8.1 mt 2.3 il 4.0 hm 8.3	Frauenberg, n. Breitfirst, Hesse.	R. Wedel.	R. Wedel, Jb. Pr. G. L-A., XI, p. 23, 1892.	Trachydolerite.	Alkalies low? Fe_2O_3 high?

SUBRANG. NOT NEEDED.

SO_3 Cl S SrO Li_2O	none none none none trace	Q 45.7 or 0.6 ab 5.2 an 29.7	di 7.7 hy 6.3 mt 2.1 il 1.4	Near Sweden, Gordon County, Georgia.	H. N. Stokes.	A. H. Brooks, B. U. S. G. S. 168, p. 55, 1900.	Meta-quartz-diorite.	

ORDER 4.—QUARDOFELIC.—AUSTRARE.

SUBRANG 3. SODIPOTASSIC. GRORUDOSE.

		Q 22.4 or 37.3 ab 23.6	ac 8.8 hy 7.0 il 1.1	Fort Davis, Apache Mountains, Texas.	A. Osann.	A. Osann, T. M. P. M., XV, p. 447, 1895.	Liparite.	
		Q 25.4 or 23.9 ab 32.0	ac 11.1 di 3.0 mt 2.6 il 1.2	Grussletten, n. Grorud, Christiania, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 48, 1894.	Grorudite.	Center of dike.
		Q 18.8 or 26.7 ab 30.9	ac 14.3 di 2.4 hy 0.6 mt 7.2	Grussletten, n. Grorud, Christiania, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 48, 1894.	Grorudite.	Border of dike.
SO_3	0.18	Q 15.3 or 26.7 ab 30.4 an 3.3 C 2.8	hy 13.2 mt 2.6 il 2.2	Süpplingen, n. Magdeburg, Prussia.	Hampe.	F. Klockmann, Jb. Pr. G. L-A., XI, p. 159, 1892.	Porphyrite.	SO_3 for S.
		Q 15.5 or 30.0 ab 40.9	ac 4.2 di 2.3 hy 1.2 mt 1.4 hm 3.8	Holbak, Siebenbürgen, Hungary.	C. v. John.	C. v. John, Jb. G. R-A. Wien., XLIX, p. 566, 1899.	Sanidinite.	
		Q 24.8 or 17.2 ab 24.6	ac 20.8 ns 3.5 di 3.8 hy 4.8	Khagiar, Cuddia Nerár, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 173, 1884.	Pantellerite.	
CuO	0.29	Q 19.6 or 21.7 ab 31.4	ac 12.1 ns 1.7 di 6.3 hy 7.0	Cuddia Mida, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 182, 1884.	Pantellerite.	

SUBRANG 4. DOSODIC. PANTELLEROSE.

ZrO_2 Cl S CoO Cu Pb	trace 0.06 none 0.08 0.03 none	Q 9.2 or 13.3 ab 47.7	ac 6.0 di 15.5 hy 1.8 mt 3.5	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. contrib.	Hornblende-granitite-gneiss.	Dried at 110°.
FeS_2	0.39	Q 13.6 or 14.5 ab 49.3	ac 2.3 di 13.5 hy 3.7 mt 1.3	Wallbach, Backofenberg, Hesse.	W. Sonne.	C. Chelius, Erl. G. K. Hesse, V. Bl. Breusbach, p. 24, 1897.	Granite.	
		Q 16.9 or 21.7 ab 38.8	ac 8.8 di 6.5 hy 5.3 mt 2.1	Mte. San Elmo, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 186, 1884.	Pantellerite.	
		Q 17.4 or 17.2 ab 33.5	ac 21.3 ns 0.8 di 6.2 hy 2.8	Mte. San Elmo, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 186, 1884.	Pantellerite.	

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum.	Sp. gr.
1	64.38	14.09	6.10	3.68	2.04	4.51	0.55	3.72	0.82					0.33		100.22	
A3. III	1.073	.138	.038	.051	.051	.080	.009	.039						.005			

RANG 4. DOCALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum.	Sp. gr.
1	63.05	14.31	1.32	6.65	4.38	3.91	2.06	0.82	2.54							100.20	
A3. III	1.051	.140	.008	.093	.110	.070	.033	.009									
2	55.39	16.81	9.87	2.60	3.22	6.03	0.83	0.62	1.07		0.93	2.19	0.69			100.25	2.78
A?2. II?G?	.923	.165	.062	.036	.081	.107	.013	.006				.026	.005				

RANG 5. PERCALCIC. GORDONASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum.	Sp. gr.
1	69.87	12.02	1.42	3.49	2.30	7.86	0.66	0.11	0.89	0.18	0.43	0.69	0.17	0.16	none	100.25	
A1. I	1.165	.118	.009	.049	.058	.140	.010	.001				.009	.001	.002	—		

CLASS II. DOSALANE.

RANG 1. PERALKALIC. PANTELLERASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum.	Sp. gr.
1	71.10	11.39	5.33	n. d.	1.54	0.08	3.95	6.37	0.44			0.57	0.05			100.82	
B2. III	1.185	.112	.033	(.031)	.039	.001	.064	.067				.007	—				
2	70.15	10.60	5.77	1.74	0.35	0.72	5.30	4.09	trace			0.65		0.52		99.89	
A2. II	1.169	.104	.036	.024	.009	.013	.085	.043				.008		.007			
3	66.50	10.90	9.85	2.34	0.60	0.64	5.56	4.54	0.20			trace	trace	trace		101.23	
B2. IV	1.108	.107	.062	.033	.015	.011	.090	.048				—	—	—			
4	61.83	14.80	1.83	5.31	2.69	0.73	3.57	4.54	2.49		0.08	1.17	0.23			99.55	2.656
A2. II	1.031	.145	.011	.074	.067	.012	.058	.048				.014	.002				
5	66.10	13.45	6.30	0.45	0.92	0.60	5.42	5.04	2.10							100.38	
A3. III	1.120	.132	.039	.006	.023	.011	.087	.054									
6	69.61	8.02	7.17	2.83	0.65	0.88	7.47	2.88	0.74							100.25	2.44
A3. III	1.160	.078	.045	.039	.016	.016	.120	.031									
7	69.02	10.09	4.42	4.56	0.76	1.45	6.29	3.70	n. d.							100.58	2.46
A3. III	1.150	.099	.027	.063	.019	.026	.101	.039									

RANG 1. PERALKALIC. PANTELLERASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum.	Sp. gr.
1	63.56	11.72	4.90	1.10	3.65	4.12	6.44	2.30	0.81	—	0.79	0.18	trace	0.24	0.01	99.99	
A1. I	1.059	.115	.030	.015	.091	.073	.104	.024				.002	—	.003	—		
2	66.73	12.23	1.31	4.18	1.49	3.25	6.14	2.53	0.62	0.05		0.32	0.22			99.46	
A2. II	1.112	.120	.008	.058	.037	.058	.099	.026				.004	.002				
3	67.89	11.53	4.51	4.52	0.62	1.51	5.79	3.71	0.33							100.41	2.43
A3. III	1.132	.113	.028	.062	.016	.027	.093	.039									
4	67.48	9.70	7.42	2.21	0.77	1.45	7.21	2.94	0.96							100.14	2.68
A3. III	1.125	.095	.046	.030	.019	.026	.116	.031									

ORDER 3 QUARFELIC. HISPANARE—Continued.

SUBRANG 1. PREPOTASSIC.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 33.7 or 21.7 ab 4.7 an 22.2 C 1.0	hy 6.8 mt 8.8	Brockenrod, Hesse.	F. Kutscher.	C. Chelius, Erl. G. Kt., Hesse, V., Bl. Breusbach, p. 24, 1897.	Granite.	

SUBRANG 3. PRESODIC.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SnO_2 0.22 CuO 0.94	Q 27.8 or 5.0 ab 17.3 an 19.5 C 2.9	hy 22.2 mt 1.9	Burgstein, n. Kleinwenden, Erzgebirge, Saxony.	Hilger.	F. v. Sandberger, Sb. Münch. A. K., XVIII, p. 444, 1888.	Gabbro.	Not fresh.
	Q 32.6 or 3.3 ab 6.8 an 25.6 C 5.5	hy 8.1 mt 2.3 il 4.0 hm 8.3	Frauenberg, n. Breitfirst, Hesse.	R. Wedel.	R. Wedel, Jb. Pr. G. L-A., XI, p. 23, 1892.	Trachydolerite.	Alkalies low? Fe_2O_3 high?

SUBRANG. NOT NEEDED.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 none Cl none S none SrO none Li_2O trace	Q 45.7 or 0.6 ab 5.2 an 29.7	di 7.7 hy 6.3 mt 2.1 il 1.4	Near Sweden, Gordon County, Georgia.	H. N. Stokes.	A. H. Brooks, B. U. S. G. S. 168, p. 55, 1900.	Meta-quartz-diorite.	

ORDER 4.—QUARDOFELIC.—AUSTRARE.

SUBRANG 3. SODIPOTASSIC. GRORUDOSE.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 22.4 or 37.3 ab 23.6	ac 8.8 hy 7.0 il 1.1	Fort Davis, Apache Mountains, Texas.	A. Osann.	A. Osann, T. M. P. M., XV, p. 447, 1895.	Liparite.	
	Q 25.4 or 23.9 ab 32.0	ac 11.1 di 3.0 mt 2.6 il 1.2	Grussletten, n. Grorud, Christiania, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 48, 1894.	Grorudite.	Center of dike.
	Q 18.8 or 26.7 ab 30.9	ac 14.3 di 2.4 hy 0.6 mt 7.2	Grussletten, n. Grorud, Christiania, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 48, 1894.	Grorudite.	Border of dike.
SO_3 0.18	Q 15.3 or 26.7 ab 30.4 an 3.3 C 2.8	hy 13.2 mt 2.6 il 2.2	Süpplingen, n. Magdeburg, Prussia.	Hampe.	F. Klockmann, Jb. Pr. G. L-A., XI, p. 159, 1892.	Porphyrite.	SO_3 for S.
	Q 15.5 or 30.0 ab 40.9	ac 4.2 di 2.3 hy 1.2 mt 1.4 hm 3.8	Holbak, Siebenbürgen, Hungary.	C. v. John.	C. v. John, Jb. G. R-A. Wien., XLIX, p. 566, 1899.	Sanidinite.	
	Q 24.8 or 17.2 ab 24.6	ac 20.8 ns 3.5 di 3.8 hy 4.8	Khagiar, Cuddia Nerar, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 173, 1884.	Pantellerite.	
CuO 0.29	Q 19.6 or 21.7 ab 31.4	ac 12.1 ns 1.7 di 6.3 hy 7.0	Cuddia Mida, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 182, 1884.	Pantellerite.	

SUBRANG 4. DOSODIC. PANTELLEROSE.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 trace Cl 0.06 S none CoO 0.08 Cu 0.03 Pb none	Q 9.2 or 13.3 ab 47.7	ac 6.0 di 15.5 hy 1.8 mt 3.5	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. contrib.	Hornblende-granitite-gneiss.	Dried at 110°.
FeS_2 0.39	Q 13.6 or 14.5 ab 49.3	ac 2.3 di 13.5 hy 3.7 mt 1.3	Wallbach, Backofenberg, Hesse.	W. Sonne.	C. Chelius, Erl. G. K. Hesse, V. Bl. Breusbach, p. 24, 1897.	Granite.	
	Q 16.9 or 21.7 ab 38.8	ac 8.8 di 6.5 hy 5.3 mt 2.1	Mte. San Elmo, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 186, 1884.	Pantellerite.	
	Q 17.4 or 17.2 ab 33.5	ac 21.3 ns 0.8 di 6.2 hy 2.8	Mte. San Elmo, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 186, 1884.	Pantellerite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	65.63	13.85	2.02	2.80	2.79	3.43	1.84	6.25	1.17			trace	trace	trace		99.77	2.864
A3. III	1.094	.136	.013	.039	.070	.060	.029	.067				—	—	—			
2	63.25	10.37	2.77	2.71	9.92	1.24	1.55	4.90	4.03			0.34				101.08	2.696
B2. III	1.054	.102	.017	.038	.248	.022	.025	.052				.004					

RANG 2. DOMALKALIC. DACASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	64.47	10.51	1.11	7.37	5.21	3.10	2.21	3.63	0.75	0.18	0.58	0.65	0.25	0.15	0.04	100.37	
A1. I	1.075	.103	.007	.103	.130	.055	.035	.038				.008	.002	.002	—		
2	62.35	13.24	3.52	6.33	0.85	3.34	2.79	3.95	1.21	0.11		1.18	0.57	0.08	0.16	99.68	
A1. I	1.039	.130	.022	.088	.021	.059	.045	.042				.014	.004	.001	.001		
3	57.98	13.58	3.11	8.68	2.87	2.01	3.56	3.44	2.47	—		1.75	0.29	0.13	0.04	99.91	
A1. I	.966	.134	.020	.121	.072	.036	.057	.036				.022	.002	.002	—		
4	61.09	15.34	5.74	3.69	1.33	3.10	3.41	3.65	1.80							99.15	
B3. IV	1.018	.150	.035	.051	.033	.055	.055	.039									
5	62.18	15.77	1.83	2.44	3.55	4.13	3.92	3.91	0.70	0.30		0.55	0.32	trace	0.43	100.23	
A1. I	1.036	.154	.011	.033	.089	.073	.063	.041				.007	.002	—	.003		
6	59.24	13.84	5.46	1.36	4.79	5.60	3.13	4.22	2.02		none	0.22	0.34	trace	trace	100.34	
A1. I	.971	.136	.034	.019	.120	.100	.050	.045				.003	.002	—	—		
7	63.97	15.78	2.35	1.87	2.84	3.71	4.36	4.01	0.49	0.09		0.48	0.40			100.40	
A2. II	1.066	.155	.015	.026	.071	.055	.070	.043				.006	.003				
8	63.05	15.58	2.92	2.11	1.70	4.15	3.77	3.66	1.38	0.55		0.60	0.27	0.12	0.13	100.06	
A1. I	1.051	.153	.018	.039	.043	.074	.061	.039				.007	.002	.002	.001		
9	60.16	13.18	8.88	3.15	1.03	3.89	3.42	3.53	1.90			0.20	trace	0.22		99.56	
A2. II	1.003	.129	.055	.044	.026	.070	.055	.037				.003	—	.003			
10	65.00	13.73	0.44	2.19	0.82	4.43	3.70	4.82	1.08		3.15	0.47	0.08	trace		100.12	2.622
A2. II	1.083	.135	.003	.030	.021	.078	.059	.051				.006	.001	—			
11	60.96	13.93	1.56	3.65	1.59	3.98	2.83	4.23	2.14		3.27	1.16	0.29	trace		99.75	2.625
A2. II	1.016	.137	.010	.051	.040	.071	.045	.045				.014	.002	—			
12	64.76	17.06	1.06	3.63	2.99	2.74	3.67	3.60	1.74							101.25	
B3. IV	1.079	.167	.007	.050	.075	.049	.059	.038									
13	62.44	15.60	2.09	3.43	2.11	1.70	3.99	4.21	2.60		0.62	0.88	0.16			99.95	2.652
A2. II	1.041	.158	.013	.046	.053	.030	.064	.045				.011	.001				
14	61.41	14.54	1.96	5.80	2.03	1.33	3.86	4.68	2.48		0.88	0.98	0.26			100.21	2.663
A2. II	1.020	.143	.012	.080	.051	.024	.062	.050				.012	.002				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 2. DOPOTASSIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 19.3 or 37.3 ab 15.2 an 11.1	di 4.6 hy 8.2 mt 3.0	Follmersdorf, Silesia.	H. Traube.	H. Traube, N. J., 1890, I, p. 212.	Hornblende-syenite.	
		Q 17.0 or 28.9 ab 13.1 an 6.1 C 0.3	hy 27.0 mt 3.9 il 0.6	Gierniger Loch, Baden.	M. Dittrich.	F. Schalch, Sp. Kt. Baden, Bl. Petersthal, p. 33, 1895.	Quartz-mica-syenite.	Border facies, Cf. No. 67, liparose.

SUBRANG 3. SODIPOTASSIC. ADAMELLOSE.

ZrO_2 S	none 0.12	Q 20.4 or 21.1 ab 18.3 an 8.3	di 5.7 hy 21.8 mt 1.6 il 1.2	Fort Ann Quadr., Essex County, New York.	W. F. Hillebrand.	J. F. Kemp, Priv. contrib.	Syenite.	
Cr_2O_3 NiO SrO Li_2O	none none trace trace	Q 21.5 or 23.4 ab 23.6 an 12.0	hy 9.1 mt 5.1 il 2.2 ap 1.3	Near Barmer's Elk, Watauga County, North Carolina.	H. N. Stokes.	A. Keith, B. U. S. G. S. 168, p. 52, 1900.	Rhyolite.	
SrO Li_2O	trace trace	Q 11.1 or 20.0 ab 29.9 an 10.0 C 0.5	hy 17.7 mt 8.0 il 3.4	Pigeon Point, Minnesota.	W. F. Hillebrand.	W. S. Bayley, A. J. S., XXXVII, p. 61, 1889.	Quartz-diorite.	Dried at 150°. Also in B. U. S. G. S. 109, p. 63, 1893.
		Q 17.7 or 21.2 ab 28.8 an 15.3	hy 5.4 mt 8.1	Pigeon Point, Minnesota.	Dodge and Sidener.	M. E. Wadsworth, B. G. Nh. S. Minn. 2, p. 82, 1887.	Gabbro?	
SO_3 Cl SrO	trace 0.04 0.16	Q 11.2 or 22.8 ab 33.0 an 13.9	di 5.3 hy 8.1 mt 2.6 il 1.1	Steamboat Mountain, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 517, 1900.	Diorite-porphyry.	
SO_3 Cl SrO	0.08 0.04 none	Q 9.5 or 25.0 ab 26.2 an 11.4	di 11.2 hy 7.0 mt 3.9 il 0.3 hm 2.7 ap 0.6	Willow Creek, Highwood Mountains, Montana.	Hurlbut and Barnes.	L. V. Pirsson, B. U. S. G. S. 148, p. 152, 1897.	Trachy-andesitic breccia.	
NiO	trace	Q 12.9 or 23.9 ab 36.7 an 11.7	di 2.9 hy 6.5 mt 3.5 il 0.9	Hurricane Ridge, Crandall Basin, Yell. Nat. Park.	W. H. Melville.	J. P. Iddings, M. U. S. G. S., XXXII, p. 261, 1889.	Quartz-mica-diorite.	
SrO Li_2O	0.07 trace	Q 16.6 or 21.7 ab 32.0 an 14.7	di 4.7 hy 2.7 mt 4.2 il 1.1	Cliff Creek, West Elk Mountains, Colorado.	W. F. Hillebrand.	W. Cross, 14 A. R. U. S. G. S., II, p. 227, 1894.	Hornblende-mica-porphyrite.	
		Q 19.1 or 20.6 ab 28.8 an 10.8	di 5.5 wo 0.8 mt 10.2 hm 1.7	Svärdfall, Brefven, Sweden.	K. Winge.	K. Winge, G. F. F., XVIII, p. 195, 1896.	Monzonite.	
SO_3	0.21	Q 16.7 or 28.4 ab 30.9 an 7.0	di 9.7 wo 1.3 mt 0.7 il 0.9	Norheim, Nahethal, Rhenish Prussia.	Hesse.	K. A. Lossen, Z. D. G. G., XLIII, p. 537, 1891.	Quartz-porphyry.	SO_3 for S. Not fresh.
SO_3	0.16	Q 17.5 or 25.0 ab 23.6 an 13.1	di 5.7 hy 4.8 mt 2.3 il 2.2	Weiselberge, n. Oberkirchen, Rhenish Prussia.	K. Böttcher.	K. A. Lossen, Z. D. G. G., XLIII, p. 537, 1891.	Porphyrite.	SO_3 for S. Not fresh.
		Q 16.9 or 21.1 ab 30.9 an 13.6 C 2.1	hy 13.2 mt 1.6	Lippenhof, n. Tryberg, Schwarzwald, Baden.	Gattermann.	G. H. Williams, N. J. B. B., II, p. 624, 1883.	Mica-diorite.	Not in Roth.
SO_3	0.12	Q 15.1 or 25.0 ab 33.5 an 8.3 C 1.4	hy 8.4 mt 3.0 il 1.5	Bullerberg, n. Magdeburg, Prussia.	Hesse.	F. Klockmann, Jb. Pr. G. L-A., 1890, XI, p. 210, 1892.	Augite-porphyrite.	SO_3 for S.
SO_3	trace	Q 11.6 or 27.8 ab 32.5 an 6.7 C 1.1	hy 12.4 mt 2.8 il 1.8	Altenhausen, n. Magdeburg, Prussia.	G. F. Steffen.	F. Klockmann, Jb. Pr. G. L-A., 1890, XI, p. 159, 1892.	Porphyrite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
15	58.58	15.26	5.61	3.28	3.02	0.98	2.45	3.80	5.14			1.38	0.37			99.94	2.674
A2. II	.976	.150	.035	.046	.076	.018	.040	.040				.017	.003				
16	57.12	15.40	2.80	4.39	5.13	2.24	2.84	3.77	4.35		0.75	1.17	0.22			100.26	2.625
A2. II	.952	.151	.017	.061	.128	.040	.046	.040				.014	.002				
17	55.47	13.86	5.98	2.64	3.65	2.75	3.63	4.35	2.94		3.25	1.19	0.22			100.07	2.683
A2. II	.925	.136	.037	.037	.091	.049	.058	.047				.014	.002				
18	62.51	12.78	2.56	4.76	3.33	4.76	2.71	4.81	1.53			0.81	trace	trace		100.59	2.901
A2. II	1.042	.125	.016	.066	.083	.085	.043	.051				.010	—	—			
19	67.94	14.86	1.60	3.62	1.91	2.02	2.52	4.01	1.57							100.05	
A3. III	1.132	.146	.010	.050	.048	.036	.040	.042									
20	65.02	15.23	1.01	3.12	1.84	2.88	2.92	6.09	2.15			trace		0.05		100.31	
A3. III	1.084	.149	.006	.043	.046	.051	.047	.065				—		.001			
21	61.45	14.36	2.75	4.61	2.73	4.34	3.98	3.75	0.87			1.37				100.21	
A3. III	1.024	.141	.017	.064	.068	.077	.064	.040				.017					

RANG 2. DOMALKALIC. DACASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	67.76	14.00	n. d.	5.18	1.00	4.28	5.22	1.19	1.01			0.46	0.19	trace		100.29	2.709
A3. III	1.129	.137	—	.072	.025	.077	.084	.013				.006	.001	—			
2	64.95	15.44	2.02	1.60	2.65	3.07	4.25	3.87	0.85	0.26		0.39	0.25	trace	0.35	100.11	
A1. I	1.083	.151	.013	.022	.066	.055	.069	.041				.005	.002	—	.002		
3	64.47	15.45	2.25	2.25	2.68	3.63	4.54	3.19	0.63	0.05		0.75	0.22	0.06	0.23	100.44	
A1. I	1.075	.151	.014	.031	.067	.065	.073	.034				.009	.002	.001	.002		
4	65.50	14.94	1.72	2.27	2.97	2.33	5.46	2.76	1.13	0.24		0.45	0.09	0.20	0.13	100.25	
A1. I	1.092	.146	.011	.032	.074	.042	.088	.029				.006	.001	.003	.001		
5	61.56	14.73	4.47	1.23	3.57	4.87	5.10	2.24	1.42			0.87	0.04	0.34		100.44	
A2. II	1.026	.144	.028	.017	.089	.087	.082	.024				.011	—	.005			
6	63.18	16.47	2.36	2.28	1.33	4.77	4.40	2.93	0.60	0.27		0.60	0.28	0.15	0.15	99.86	
A1. I	1.053	.162	.015	.032	.033	.085	.071	.031				.008	.002	.002	.001		
7	62.92	14.29	0.84	4.66	3.14	2.72	4.30	1.39	2.84	0.22	1.24	0.84	0.13	0.15	0.10	100.10	
A1 I	1 057	.140	.005	.065	.079	.049	.068	.015				.010	.001	.002	.001		
8	68.58	13.04	0.26	3.40	1.01	3.22	4.94	1.90	1.00	0.16	1.31	0.57	0.20	0.15	0.10	99.99	
A1. I	1.143	.128	.002	.048	.025	.057	.079	.020				.007	.001	.002	.001		
9	62.16	16.12	3.39	1.85	2.93	4.59	5.20	2.29	1.12		trace	0.23	0.16	0.20	0.07	100.36	
A1. I	1.036	.158	.021	.026	.073	.082	.084	.024				.003	.001	.003	—		
10	63.50	15.34	3.22	1.71	2.50	4.31	4.84	2.75	1.99							100.16	
A3 III	1.058	.150	.020	.024	.063	.077	.077	.030									

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 3. SODIPOTASSIC. ADAMELLOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO$_3$	0.07	Q 23.0 or 22.2 ab 21.0 an 5.0 C 5.3	hy 7.6 mt 6.7 il 2.6 hm 1.0	Zissendorfer Berg, n. Magdeburg, Prussia.	Fischer.	F. Klockmann, Jb. Pr. G. L-A., 1890, XI, p. 210, 1892.	Porphyrite.	SO$_3$ for S. Not fresh.
SO$_3$	0.08	Q 11.9 or 22.2 ab 24.1 an 11.1 C 2.6	hy 16.7 mt 3.9 il 2.2	Bosenberg, Harz Mountains.	Jacobs.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 266, 1892.	Porphyrite.	SO$_3$ for S. Not fresh.
SO$_3$	0.14	Q 14.6 or 26.1 ab 19.9 an 8.6	di 3.9 hy 7.3 mt 5.3 il 2.2 hm 2.2	Spiemont, Harz Mountains.	K. Böttcher.	K. A. Lossen, Jb. Pr. G. L-A. 1889, X, p. 266, 1892.	Porphyrite.	SO$_3$ for S. Not fresh.
		Q 14.3 or 28.4 ab 22.5 an 8.6	di 12.5 hy 7.4 mt 3.7 il 1.5	Reichenstein, Silesia.	H. Traube.	H. Traube, N. J., 1890, I, p. 206.	Hornblende-syenite.	
		Q 28.8 or 23.4 ab 21.0 an 10.0 C 2.9	hy 10.1 mt 2.3	Raffernertobel, n. Meran, Tyrol.	M. Dittrich.	E. Künzli, T. M. P. M., XVIII, p. 418, 1899.	Granitite-gneiss.	
		Q 14.5 or 36.1 ab 24.6 an 10.3	di 3.2 hy 7.8 mt 1.4	Monte Amiata, Tuscany.	L. Ricciardi.	L. Ricciardi, Gaz. Chim. Ital., XVIII, 1888.	Trachyte.	
		Q 11.3 or 22.2 ab 33.5 an 10.3	di 9.1 hy 6.4 mt 3.9 il 2.6	Latitude 36° 30′ N., longitude 80° E., Thibet.	H. Bäckström.	H. Bäckström, Pet. Mit. Erg. Hft., No. 131, p. 2, 1900?	Bronzite-andesite.	

SUBRANG 4. DOSODIC. DACOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 20.3 or 7.2 ab 44.0 an 11.1	di 7.8 hy 6.8 il 0.8	Sudbury, Ontario.	Not stated.	T. L. Walker, Q. J. G. S., LIII, p. 56, 1897.	Granite.	Nearly in SR 5
SO$_3$ Cl SrO	0.02 0.04 0.10	Q 15.4 or 22.8 ab 36.2 an 11.4	di 3.2 hy 5.7 mt 3.0 il 0.8	Bear Park, Little Belt Mountains, Montana.	H. N. Stokes.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 519, 1900.	Diorite-syenite-porphyry.	
SrO	0.04	Q 14.3 or 18.9 ab 38.3 an 12.2	di 4.8 hy 6.0 mt 3.2 il 1.4	Big Timber Creek, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 148, p. 142, 1897.	Hornblende-granitite.	
SO$_3$ SrO	0.06 trace	Q 13.7 or 16.1 ab 46.1 an 8.1	di 3.1 hy 8.0 mt 2.6 il 0.9	Sepulchre Mountain, Yellowstone National Park.	T. M. Chatard.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 648, 1891.	Hornblende-mica-andesite.	
		Q 10.6 or 13.3 ab 43.0 an 10.6	di 10.7 hy 4.0 mt 1.6 il 1.7 hm 3.4	Tower Creek, Yellowstone National Park.	F. A. Gooch.	J. P. Iddings, M. U.S.G.S., XXXII, p. 272, 1899.	Hornblende-andesite.	
SrO Li$_2$O	0.09 trace	Q 15.2 or 17.2 ab 37.2 an 16.7	di 5.7 hy 1.7 mt 3.5 il 1.2	Sierra Carrizo, Arizona.	W. F. Hillebrand.	W. Cross, 14 A. R. U. S. G. S., p. 165, 1894.	Hornblende-porphyrite.	
FeS$_2$ NiO SrO Li$_2$O	0.32 trace trace trace	Q 19.9 or 8.3 ab 35.6 an 13.6 C 0.8	hy 14.5 mt 1.2 il 1.5 pr 0.3	Bear Creek, Cook's Inlet, Alaska.	W. F. Hillebrand.	G. F. Becker, 18 A. R. U. S. G. S., III, p. 45, 1898.	Diorite.	
FeS$_2$ SrO	0.15 trace	Q 23.9 or 11.1 ab 41.4 an 8.1	di 6.7 hy 4.3 mt 0.5 il 1.1	Near Latrobe, Eldorado County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 473, 1894.	Porphyrite.	Also in J. G., III, p. 403, 1895.
ZrO$_2$ Cl FeS$_2$ CoO Cu Pb	trace 0.02 trace 0.01 0.02 none	Q 10.7 or 13.3 ab 44.0 an 13.9	di 7.1 hy 4.6 mt 4.9	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. contrib.	Hornblende-granitite.	Dried at 100°. Near akerose.
		Q 13.7 or 16.7 ab 40.7 an 12.0	di 6.3 hy 3.3 mt 4.6	Chiles Volcano, Colombia.	R. Küch.	R. Küch, G. Stud. Colomb., I, p. 172, 1892.	Pyroxene-hornblende-dacite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	A_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
11	63.49	12.42	6.41	1.34	1.32	4.17	4.90	1.78	2.88				trace	0.85		99.56	2.52
A3. III	1.058	.121	.040	.018	.033	.075	.079	.019					—	.012			15°
12	63.41	16.92	2.67	2.96	2.08	4.32	5.18	2.36	0.64							100.54	
A3. III	1.057	.166	.017	.041	.052	.077	.084	.024									
13	64.17	14.73	0.57	5.83	2.09	3.76	3.81	3.35	2.24							100.55	
A3. III	1.070	.144	.004	.080	.042	.067	.061	.036									
14	64.94	17.50	0.69	3.94	2.83	2.59	3.44	3.11	1.36							100.40	
A3. III	1.082	.172	.004	.055	.071	.047	.055	.032									
15	59.94	16.11	4.29	2.68	3.02	1.74	4.78	2.55	3.07		0.40	1.44	0.24			100.43	2.651
A2. II	.999	.158	.027	.038	.076	.030	.077	.027				.017	.002				
16	61.31	16.34	2.23	3.17	2.07	2.43	4.86	2.96	3.08		1.08	0.77	0.27			100.93	2.624
A2. II	1.022	.160	.014	.044	.052	.043	.078	.032				.009	002				
17	63.94	13.05	2.45	7.52	0.43	3.35	4.45	3.68	0.34				0.93	0.12		100.26	
A3. III	1.066	.128	.015	.104	.011	.060	.072	.039					.006	.002			
18	67.38	15.46	3.66	n. d.	1.03	4.72	4.98	2.14	0.41				0.04	0.29		100.11	
A4. IV	1.123	.151	0.23	(.046)	.026	.084	.080	.023					—	.004			
19	64.06	15.25	2.72	4.30	1.30	3.93	4.37	2.78	1.70			0.18				100.59	2.352
A3. III	1.068	.149	.017	.059	.032	.070	.070	.031				.002					

RANG 2. DOMALKALIC. DACASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	A_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	64.49	14.26	3.91	3.28	1.25	3.67	6.60	0.40	1.22							99.08	
B3. IV	1.075	.140	.025	.046	.031	.066	.106	.004									

RANG 3. ALKALICALCIC. TONALASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	A_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	57.33	15.31	3.39	8.19	4.36	3.95	1.22	4.57	1.80							100.12	
A3. III	.956	.150	.021	.114	.109	.071	.020	.049									
2	54.36	14.71	1.89	6.11	7.92	2.42	1.18	4.62	4.05		0.47	0.96	0.52			99.64	2.755
A2. II	.906	.144	.012	.085	.198	.043	.019	.049				.012	.003				
3	58.46	14.38	3.75	6.67	1.59	5.24	1.33	3.40	2.03		3.40			0.36		(100.61)	
A3. III F	.974	.141	.024	.093	.040	.093	.021	.036						.005		100.45	

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. DACOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 Cl CuO	trace trace trace	Q 20.3 or 10.6 ab 41.4 an 6.4	di 7.2 wo 2.2 mt 4.2 hm 3.5	Yate Volcano, Patagonia.	H. Ziegenspeck.	H. Ziegenspeck, In. Diss. Jena, p. 46, 1883.	Augite-andesite.	
		Q 11.9 or 13.3 ab 44.0 an 16.1	di 4.5 hy 6.2 mt 3.9	Inchnadampf, Assynt, Scotland.	J. J. H. Teall.	J. J. H. Teall, G. M., XXIII, p. 350, 1886.	Hornblende-porphyrite.	
		Q 15.4 or 20.0 ab 32.0 an 13.1	di 4.7 hy 11.8 mt 0.9	Föglö, Aland, Finland.	H. Berghell.	B. Frosterus, G. F. F., XV., p. 285, 1893.	Granite.	Near adamellose.
		Q 20.6 or 17.8 ab 28.8 an 13.1 C 3.7	hy 13.8 mt 0.9	Lippenhof, n. Tryberg, Schwarzwald, Baden.	G. H. Williams.	G. H. Williams, N. J. B. B., II, p. 624, 1883.	Mica-diorite.	
SO_3	0.17	Q 14.3 or 15.0 ab 40.8 an 8.3 C 2.4	hy 7.6 mt 4.9 il 2.6 hm 1.0	Gerach, Fischbach Thal, Rhenish Prussia.	K. Gremse.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 290, 1892.	Porphyrite.	SO_3 for S.
SO_3 Org	0.14 0.02	Q 12.2 or 17.8 ab 40.9 an 12.0 C 0.7	hy 8.0 mt 3.2 il 1.4	Horst, Blatt Lebach, Prussia.	K. Gremse.	Weiss & Greve, Erl. G. K. Pr., Bl. Lebach, p. 32, 1889.	Hornblende-porphyrite.	SO_3 for S.
		Q 14.5 or 21.7 ab 37.7 an 4.7	di 6.1 hy 9.7 mt 3.5 ap 1.9	Bomb, Eruption 1889–9, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 107, 1892.	Andesite.	Near pantellerose.
		Q 18.1 or 12.8 ab 41.9 an 13.3	di 8.6 hy 4.2	Bomb, Eruption 1888–9, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 107, 1892.	Andesite.	
		Q 15.9 or 17.2 ab 36.7 an 13.3	di 5.0 hy 6.1 mt 3.9	Kakoperato, Aegina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende-dacite.	

SUBRANG 5. PERSODIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 16.0 or 2.2 ab 55.5 an 8.3	di 8.1 hy 1.9 mt 5.8	White Island, New Zealand.	W. A. McLeod.	W. A. McLeod, Tr. N. Z. Inst., XXXI, p. 488, 1899.	Hypersthene-andesite.	Sum low.

SUBRANG 2. DOPOTASSIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Li_2O	trace	Q 11.9 or 27.2 ab 10.5 an 19.7 C 1.0	hy 23.2 mt 4.9	Dorsey's Run, Howard County, Maryland.	W. F. Hillebrand.	C. R. Keyes, 15 A. R. U. S. G. S., p. 722, 1895.	Inclusion in granite.	
SO_3 C	0.38 0.05	Q 9.2 or 27.2 ab 10.0 an 12.0 C 3.3	hy 27.8 mt 2.8 il 1.8 ap 1.1	Michaelstein, Lower Harz Mountains.	F. Steffen.	M. Koch, Jb. Pr. G. L-A. 1886, VII, p. 68, 1887.	Kersantite.	SO_3 for S.
		Q 20.8 or 20.0 ab 11.0 an 23.4	di 2.2 hy 12.0 mt 5.6	Dolanky, Moldauthal, Bohemia.	Plaminek.	J. Klvana, Cf. N. J., 1898, I, p. 485.	Dioritic quartz-syenite.	Not fresh.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	56.20	15.46	1.54	9.76	1.83	5.39	2.78	2.56	0.59	0.16	none	2.25	1.13	0.13	0.17	100.02	
A1. I	.937	.151	.010	.137	.046	.096	.045	.027				.027	.008	.002	.001		
2	58.77	13.12	5.45	6.87	4.93	5.99	1.94	2.83	0.45							100.35	
A3. III	.980	.129	.034	.096	.123	.107	.031	.030									
3	64.34	15.72	1.62	2.94	2.17	4.24	2.76	4.04	0.76	0.25	0.03	0.53	0.14	0.12	0.06	99.81	
A1. I	1.072	.154	.010	.041	.054	.076	.044	.042				.007	.001	.002	——		
4	64.17	15.25	2.16	2.98	2.60	4.24	2.62	4.34	0.65	0.16	none	0.67	0.16	0.04	0.07	100.18	
A1. I	1.070	.149	.014	.042	.065	.076	.042	.046				.008	.001	.001	.001		
5	63.87	15.39	1.93	3.08	2.23	4.30	2.76	4.18	0.69	0.19	0.15	0.65	0.17	0.11	0.07	99.92	
A1. I	1.065	.151	.012	.043	.056	.077	.044	.045				.008	.001	.002	.001		
6	61.64	15.63	3.39	2.69	2.82	4.90	2.64	3.72	0.91	0.28	none	0.71	0.21	0.04	0.08	99.70	
A1. I	1.027	.153	.021	.038	.072	.087	.042	.039				.009	.002	.001	.001		
7	60.17	15.78	3.42	2.95	2.52	4.69	2.96	4.16	1.23	0.25		0.87	0.40	0.11	0.14	99.79	
A1. I	1.003	.154	.021	.042	.063	.084	.048	.045				.011	.003	.002	.001		
8	59.76	15.79	3.77	3.30	2.16	3.88	3.01	4.40	1.11	0.31	0.78	0.87	0.42	0.12	0.09	99.83	
A1. I	.996	.155	.024	.046	.054	.070	.048	.047				.011	.003	.002	.001		
9	57.80	16.43	1.62	6.51	4.14	7.21	2.35	2.29	0.31	0.11	none	0.70	0.19	0.18	0.09	100.03	
A1. I	.963	.161	.010	.090	.104	.128	.038	.024				.009	.001	.003	.001		
10	57.26	16.51	3.27	5.19	3.41	6.69	2.65	2.93	0.95	0.20		0.53	0.30	0.18	0.10	100.23	
A1. I	.954	.162	.020	.072	.085	.120	.043	.031				.007	.002	.003	.001		
11	63.85	15.84	1.91	2.75	2.07	4.76	3.29	3.08	1.65	0.28		0.58	0.13	0.07	0.06	100.36	
A1. I	1.064	.155	.012	.039	.052	.085	.053	.033				.007	.001	.001	——		
12	58.55	15.48	3.93	2.07	3.60	6.44	1.69	3.99	3.62			0.83	0.30	0.11		100.61	
A2. II	.976	.152	.024	.030	.090	.115	.027	.042				.010	.002	.002			
13	62.6	17.7	1.2	3.3	3.4	4.6	2.5	3.7	0.7							99.7	2.76
A3. III	1.043	.174	.007	.046	.085	.082	.040	.039									
14	55.95	19.35	4.60	3.00	2.52	5.40	2.86	2.64	1.05			2.80		0.21		100.38	
B2. III	.933	.190	.029	.042	.063	.096	.046	.028				.034		.003			
15	57.69	14.48	4.40	1.71	5.63	5.42	2.73	2.94	3.44		0.11	0.82	0.29			99.88	2.66
A2. II	.962	.142	.027	.024	.141	.096	.043	.031				.010	.002				
16	57.64	14.49	3.17	5.81	4.62	8.02	2.13	2.32	1.77		0.13	0.31	0.23			100.64	2.837
A2. II	.961	.142	.020	.080	.116	.143	.034	.024				.004	.002				
17	57.28	15.98	2.35	5.06	5.52	2.84	2.37	3.42	4.22		0.41	1.01	0.18			100.64	2.653
A2. II	.955	.157	.015	.071	.138	.050	.039	.036				.012	.001				
18	56.91	15.54	2.32	4.98	5.71	5.80	2.45	2.74	2.29			1.09	0.21			100.19	2.791
A2. II	.959	.152	.014	.070	.143	.103	.040	.029				.013	.002				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 3. SODIPOTASSIC. HARZOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 Cl F S SrO	trace trace trace 0.07 trace	Q 12.1 or 14.0 ab 23.6 an 22.0	hy 17.8 mt 4.3 il 4.2 ap 2.3	Walleska, Cherokee County, Georgia.	H. N. Stokes.	A. H. Brooks, B. U. S. G. S. 168, p. 55, 1900.	Quartz-gabbro.	Near tonalose.
		Q 15.2 or 16.7 ab 16.2 an 18.9	di 8.9 hy 16.2 mt 7.9	St. Cloud, Minnesota.	Dodge and Sidener.	M. E. Wadsworth, B. G. Nh. S. Minn., II, p. 86, 1887.	Gabbro.	Dark portion. Cf. No. 7, tonalose.
ZrO_2 S SrO Cu	0.02 0.03 0.03 0.01	Q 20.0 or 23.4 ab 23.1 an 18.9	di 1.9 hy 7.7 mt 2.3 il 1.1	Atlantic Mine, Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899.	Granite.	Complete in B. U. S. G. S. 168, p. 117, 1900.
SO_3 Cl SrO	0.07 trace trace	Q 19.2 or 25.6 ab 22.0 an 17.0	di 3.5 hy 7.5 mt 3.2 il 1.2	Frohner Mine, Helena, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899.	Granite.	
ZrO_2 S SrO Cu	0.03 0.07 0.04 0.01	Q 19.4 or 25.0 ab 23.1 an 17.2	di 4.5 hy 6.3 mt 2.8 il 1.2	Alice Mine, Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899.	Granite.	Complete in B. U. S. G. S. 168, p. 117, 1900.
SO_3 SrO	none 0.04	Q 17.5 or 21.7 ab 22.0 an 22.8	di 1.3 hy 7.6 mt 4.9 il 1.4	Red Rock Creek, Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899.	Diorite.	
V_2O_3 SrO Li_2O	0.01 0.09 trace	Q 13.6 or 25.0 ab 25.2 an 17.0	di 5.3 hy 5.0 mt 4.9 il 1.7	Tintic Mountain, Tintic District, Utah.	H. N. Stokes.	Tower and Smith, 19 A. R. U. S. G. S., III, p. 641, 1899.	Andesite.	
V_2O_3 SrO MoO Li_2O	0.02 trace trace trace	Q 14.6 or 26.1 ab 24.1 an 16.7	di 2.4 hy 5.8 mt 5.6 il 1.7	Iron Duke Mine, Tintic District, Utah.	H. N. Stokes.	Tower and Smith, 19 A. R. U. S. G. S., III, p. 647, 1899.	Monzonite.	
FeS_2 NiO SrO Li_2O	none 0.03 trace? trace	Q 11.3 or 13.3 ab 19.9 an 27.5	di 6.7 hy 16.6 mt 2.3 il 1.4	E. of Sonora, Tuolumne County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 724, 1896.	Quartz-pyroxene-diorite.	Near marylandose.
SrO Li_2O	0.06 trace	Q 10.3 or 17.2 ab 22.5 an 24.5	di 7.3 hy 10.9 mt 4.6 il 1.1	E. of Milton, Sierra County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 724, 1896.	Quartz-mica-diorite.	
FeS_2 SrO Li_2O	0.04 trace trace	Q 19.3 or 18.3 ab 27.8 an 19.2	di 3.7 hy 6.1 mt 2.8 il 1.1	Grass Valley, Nevada County, California.	W. F. Hillebrand.	W. Lindgren, 17 A. R. U. S. G. S., II, p. 44, 1896.	Granodiorite.	
		Q 16.4 or 23.4 ab 14.1 an 23.1	di 6.9 hy 5.8 mt 4.6 il 1.5 hm 0.6	Cedar Hill Ridge, Washoe, Nevada.	G. E. Moore.	G. F. Becker, M. U. S. G. S., III, p. 152, 1882.	Hornblende-andesite.	
		Q 16.9 or 21.7 ab 21.0 an 22.8 C 1.3	hy 13.6 mt 1.6	Ben Dambaim, Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Hornblende-granitite.	One decimal.
		Q 13.7 or 15.6 ab 24.6 an 26.7 C 2.0	hy 6.3 mt 1.9 il 5.2 hm 3.3	Fjulsrud, Humledal, Norway.	G. Särnström.	W. C. Brögger, Z. K., XVI, p. 53, 1890.	Porphyry.	TiO_2 high?
SO_3 Org	0.17 0.05	Q 12.8 or 17.2 ab 22.5 an 18.9	di 6.0 hy 11.3 mt 3.2 il 1.5 hm 2.0	Peterberg, Bl. Wadern, Rh. Prussia.	K. Böttcher.	H. Greb, Erl. G. K. Pr. Bl. Wadern, p. 34, 1889.	Bronzite-porphyrite.	SO_3 for S.
SO_3	trace	Q 12.6 or 13.3 ab 18.4 an 23.4	di 13.4 hy 13.0 mt 4.6	Ole Padde, Harz Mountains.	F. Steffen.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 290, 1892.	Augite-tonalite.	
SO_3	trace	Q 13.4 or 20.0 ab 20.4 an 18.9 C 3.3	hy 19.6 mt 3.5 il 1.8	Steinhubel, St. Wendel, Harz Mountains.	Hesse.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 266, 1892.	Diorite-porphyrite.	
SO_3	0.15	Q 10.5 or 16.1 ab 21.0 an 22.5	di 5.0 hy 17.5 mt 3.1 il 2.1	Bolmke Thal, Wernigerode, Harz Mountains.	K. Hampe.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 309, 1892.	Enstatite-porphyrite.	SO_3 for S.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
19	65.87	14.88	1.77	3.11	2.93	4.61	2.12	4.22	0.83			0.43		trace		100.77	2.899
A3. III	1.098	.146	.011	.043	.073	.082	.034	.045				.005		—			
20	62.69	12.77	3.22	4.79	3.09	5.02	2.39	3.63	1.06			1.22	trace	0.60		100.48	2.952
A2. II	1.045	.125	.020	.067	.077	.089	039	.038				.015	—	.009			
21	60.58	11.92	3.05	8.14	3.88	6.97	1.21	2.55	0.95			1.14	trace	0.63		101.02	2.926
B2. III	1.010	.117	.020	.112	.097	.125	.019	.027				.013	—	.009			
22	63.06	18.01	2.48	1.31	4.55	2.72	2.01	3.88	2.20							100.22	
A3. III	1.051	.176	.016	.018	.114	.048	.032	.041									
23	60.01	17.05	1.83	4.15	1.12	6.58	2.31	5.12	1.40				0.42	0.09		100.12	2.543
B3. IV	1.001	1.67	.011	.058	.028	.118	.037	.055					.003	.001			
24	55.23	14.06	5.06	4.12	4.00	9.34	2.07	2.43	1.07				1.33	0.57		100.12	
A3. III	.921	.138	.032	.057	.100	.166	.034	.025					.009	.008			
25	60.68	16.19	5.37	1.58	2.96	5.88	3.11	3.95	0.98	—						100.70	2.640
A3. III	1.011	.159	.034	.022	.074	.105	.050	.042									17°
26	62.43	17.88	1.78	3.53	4.50	3.43	3.10	2.75	1.37	—		trace	trace			100.77	2.74
A3. III	1.041	.175	.011	.049	.113	.049	.050	.030				—	—				
27	57.69	15.65	7.42	2.41	3.10	6.92	2.33	2.37	1.59	—			0.22	trace		99.73	2.779
A3. III	.962	.153	.046	.033	.077	.123	.037	.025					.002	—			

RANG 3. ALKALICALCIC. TONALASE.

1	58.59	15.04	3.94	3.48	4.49	5.29	3.20	2.90	1.96			0.55	0.22			99.66	
A2. II	.977	.147	.024	.049	.112	.094	.051	.030				.007	.002				
2	59.77	15.38	2.65	3.44	4.40	4.81	3.61	2.83	1.51	—		0.53	0.21			99.14	
A2. II	.996	.150	.017	.048	.110	.086	.058	.030				.007	.002				
3	59.71	15.41	2.63	3.52	4.36	4.90	3.55	2.80	1.52	—		0.60	0.22			99.22	
A2. II	.994	.151	.016	.049	.109	.087	.057	.030				.007	.002				
4	61.40	16.59	2.13	3.05	2.73	6.17	3.83	1.34	0.88	0.82	none	0.79	0.20	0.13	0.02	100.10	
A1. I	1.023	.163	.013	.042	.063	.110	.061	.015				.010	.001	.002	—		
5	56.78	14.33	5.76	9.27	1.58	5.26	3.43	1.75	0.10	0.33		1.44	0.36	0.25		100.64	
A2. II	.946	.140	.036	.129	.040	.094	.055	.019				.017	.002	.004			
6	66.68	14.93	1.58	3.32	2.19	4.89	2.65	2.05	1.09	0.16		0.50	0.10	0.10	0.08	100.32	
A1. I	1.111	.146	.010	.046	.055	.087	.043	.021				.006	.001	.001	.001		
7	61.19	15.22	3.20	3.55	2.38	7.94	3.17	2.62	0.40					trace		99.67	
A3. III	1.020	.149	.020	.060	.060	.142	.051	.027						—			
8	60.32	15.80	5.42	0.89	5.08	4.65	4.09	1.82	1.67				0.12			99.86	
A3. III	1.005	.155	.084	.012	.127	.083	.066	.020					.001				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 3. SODIPOTASSIC. HARZOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 22.5 or 25.0 ab 17.8 an 18.6	di 3.5 hy 9.2 mt 2.6 il 0.8	Wachberg, Droschkau, Silesia.	H. Traube.	H. Traube, N. J. 1890, I, p. 218.	Syenite.	
		Q 19.6 or 21.1 ab 20.4 an 16.1	di 7.0 hy 8.6 mt 4.6 il 2.2	Near Neudeck, Silesia.	H. Traube.	H. Traube, N. J., 1890, I, p. 220.	Syenite.	
		Q 21.7 or 15.0 ab 10.0 an 19.7	di 12.8 hy 13.7 mt 4.6 il 2.0	Neudeck, Silesia.	H. Traube.	H. Traube, N. J., 1890, I, p. 222.	Syenite.	
		Q 23.9 or 22.8 ab 16.8 an 13.3 C 5.6	hy 11.8 mt 3.7	Arnsdorf, Riesengebirge, Silesia.	Herz.	L. Milch, N. J. B. B., XII, p. 223, 1899.	Schliere in granitite.	
		Q 11.6 or 30.6 ab 19.4 an 20.9	di 7.4 hy 5.2 mt 2.6 ap 1.1	San Magno, Latera Crater, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 99.	Trachyte.	Alkalies low? Also in N. J. B. B., VI, p. 10, 1889.
SO_3 Cl	0.84 trace	Q 13.4 or 13.9 ab 17.8 an 22.0	di 13.4 hy 7.0 mt 7.4 ap 2.8	Radicofani, Tuscany.	L. Ricciardi.	G. Mercalli, Att. Soc. It. Sc. Nat., XXX, p. 375, 1887.	Andesite.	P_2O_5 high?
		Q 12.8 or 23.4 ab 26.2 an 18.6	di 8.2 hy 3.6 mt 5.1 hm 1.9	Mount Pagos, Smyrna, Asia Minor.	H. S. Washington.	H. S. Washington, A. J. S., III, p. 43, 1897.	Augite-andesite.	Dried at 110°.
		Q 17.4 or 16.7 ab 26.2 an 16.7 C 3.6	hy 16.3 mt 2.6	Ensay, Omeo, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XXII, p. 99, 1886.	Quartz-mica-diorite.	Dried at 100°. Near tonalose.
		Q 18.0 or 13.9 ab 19.4 an 25.3	di 6.9 hy 4.5 mt 9.8	Tambo River, Omeo, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XX, p. 31, 1884.	Quartz-mica-diorite.	Dried at 100°.

SUBRANG 4. DOSODIC. TONALOSE.

		Q 12.1 or 16.7 ab 26.7 an 18.3	di 6.3 hy 10.5 mt 5.6 il 1.1	Average of igneous rocks of the earth.	Various analysts.	F. W. Clarke, B. U. S. G. S. 78, pp. 37 and 38, 1891.		Cf. B. U. S. G. S. 148, p. 12, 1897.
		Q 11.3 or 16.7 ab 30.4 an 17.2	di 5.5 hy 11.4 mt 3.9 il 1.1	Average igneous rock of the United States.	Chemists of U. S. G. S.	F. W. Clarke, B. U. S. G. S., 148, p. 12, 1897.		H_2O above 110°
		Q 11.2 or 16.7 ab 29.9 an 17.8	di 5.3 hy 11.8 mt 3.7 il 1.1	Average igneous rock of the United States.	Chemists of U. S. G. S.	F. W. Clarke, B. U. S. G. S., 168, p. 14, 1900.		H_2O above 110°.
ZrO_2 S Cr_2O_3 V_2O_3 SrO	none none trace 0.02 trace?	Q 17.3 or 8.3 ab 32.0 an 24.2	di 5.3 hy 6.2 mt 3.0 il 1.5	Edmunds Hill, Aroostook County, Maine.	W. F. Hillebrand.	H. E. Gregory, A. J. S., VIII, p. 365, 1899.	Andesite.	Also in B. U. S. G. S., 165, p. 171, 1900.
		Q 13.6 or 10.6 ab 28.9 an 18.3	di 6.7 hy 10.6 mt 8.4 il 2.6	Rocky Hill, Somerset County, New Jersey.	A. H. Phillips.	A. H. Phillips, A. J. S., VIII, p. 279, 1899.	Diabase.	
SrO Li_2O	trace trace	Q 28.4 or 11.7 ab 22.5 an 22.8	di 1.1 hy 8.9 mt 2.3 il 0.9	Rowlandsville, Cecil County, Maryland.	W. F. Hillebrand.	G. H. Williams, 15 A. R. U. S. G. S., p. 672, 1895.	Biotite-granite.	
		Q 14.3 or 15.0 ab 26.7 an 19.7	di 16.2 hy 3.3 mt 4.6	St. Cloud, Minnesota.	Dodge and Sidener.	M. E. Wadsworth, B. G. Nh. S. Minn., 2, p. 86, 1887.	Gabbro.	Light portion cf No. 2, harzose.
		Q 12.6 or 11.2 ab 34.6 an 19.2	di 3.1 hy 11.3 mt 2.8 hm 3.5	Epsilon Lake, Lake County, Minnesota.	J. A. Dodge.	N. H. Winchell, 21 A. R. G., Nh. S. Minn., p. 58, 1893.	Porphyrite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
9	59.48	16.37	3.21	3.17	3.29	4.88	3.30	2.81	2.01			0.93	0.41	0.19	0.13	100.21	
A1. I	.991	.160	.020	.044	.082	.087	.053	.030				.012	.003	.003	.001		
10	65.11	16.21	1.06	3.19	2.57	3.97	4.00	2.51	0.94			0.71	0.02	none		100.33	
A1. I	1.085	.159	.007	.044	.064	.071	.064	.027				.009	—	—			
11	64.07	15.82	3.40	1.44	3.39	4.43	4.06	2.27	0.42	0.10		0.45	0.18	trace		100.08	
A2. II	1.068	.155	.021	.020	.085	.079	.065	.024				.006	.001	—			
12	61.22	16.14	3.01	2.58	4.21	5.46	4.48	1.87	0.40	0.04		0.61	0.25	trace		100.36	
A2. II	1.020	.158	.019	.036	.105	.098	.072	.020				.008	.002	—			
13	58.49	16.70	3.85	2.37	3.12	5.90	3.47	1.59	2.44			1.71	trace	0.24		100.52	
A1. I	.975	.164	.024	.033	.078	.105	.056	.017				.021	—	.003			
14	56.28	14.23	4.69	4.05	6.37	7.94	2.98	1.23	0.93			0.84	0.40	0.16		100.28 .04 100.24	
A1. I	.938	.140	.029	.056	.159	.142	.048	.013				.010	.003	.002			
15	60.30	16.31	4.35	1.41	2.39	5.62	3.99	2.36	1.86	0.64		0.76	0.20	0.13	0.15	100.57	
A1. I	1.005	.160	.027	.020	.060	.100	.064	.025				.009	.001	.002	.001		
16	56.61	13.62	5.89	2.60	5.48	6.61	3.13	2.71	1.07	1.20		0.79	0.06	0.35	0.14	100.31	
A1. I	.944	.134	.037	.036	.137	.118	.050	.029				.010	—	.005	.001		
17	55.83	17.11	4.07	3.75	5.05	7.40	2.94	1.71	1.28			1.05	0.21	none		100.40	
A2. II	.931	.168	.025	.052	.126	.132	.047	.018				.013	.002	—			
18	61.16	16.17	2.89	2.18	3.89	4.26	3.87	3.20	2.09			0.23	0.13	trace		100.07	
A2. II	1.019	.159	.018	.030	.097	.076	.062	.034				.003	.001	—			
19	61.45	15.07	4.46	1.18	3.02	5.37	4.00	1.22	1.23			2.80	trace	none		100.14	
A2. II	1.024	.148	.028	.017	.076	.096	.064	.013				.035	—	—			
20	60.15	17.85	2.00	2.02	3.26	5.48	3.95	2.36	1.24	0.25	none	0.47	0.22	0.07	0.20	99.62	
A1. I	1.003	.175	.013	.028	.082	.098	.064	.025				.006	.002	.001	.001		
21	60.00	16.37	2.28	2.46	3.81	4.96	3.73	2.70	1.42	0.61	0.17	0.59	0.35	0.05	0.26	99.87	
A1. I	1.000	.160	.014	.034	.095	.089	.059	.029				.007	.002	.001	.002		16°
22	64.81	15.73	1.68	2.91	2.82	4.22	3.98	1.43	0.62		1.08	0.08	0.23	0.08		100.61	2.740
A1. I	1.080	.154	.011	.040	.071	.075	.064	.015				.001	.002	.001			
23	63.16	17.21	2.43	2.30	1.27	6.27	4.70	1.84	0.69			0.21	0.12	trace	0.09	100.29	
A1. I	1.053	.169	.015	.032	.032	.112	.076	.020				.003	.001	—	.001		
24	62.88	17.13	1.86	2.58	1.48 ✓	5.39	4.50	2.25	0.42	0.16	none	0.51	0.26	0.16	0.16	99.86	
A1. I	1.048	.168	.012	.036	.037	.096	.072	.024				.006	.002	.002	.001		
25	59.42	16.79	3.23	3.29	2.24	5.57	4.15	2.82	0.79	0.27	0.44	0.68	0.35	0.13	0.14	100.38	
A1. I	.990	.164	.020	.046	.046	.100	.067	.080				.008	.002	.002	.001		
26	59.19	18.00	3.07	2.32	1.41	6.55	4.01	2.74	1.06	0.46	none	0.58	0.29	0.19	0.18	100.18	
A1. I	.970	.176	.020	.032	.034	.117	.064	.029				.007	.002	.003	.001		

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cr_2O_3 NiO	0.03 trace	Q 14.6 or 16.7 ab 27.8 an 21.4	hy 10.0 mt 4.6 il 1.7 ap 1.0	Red Bluff, Madison County, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 651, 1895.	Hypersthene-andesite.	Complete in B. U.S.G.S., 148, p. 140, 1897.
SO_3 Cl Li_2O	trace none 0.04	Q 18.5 or 15.0 ab 33.5 an 18.9	di 0.8 hy 9.7 mt 1.6 il 1.4	Electric Peak, Yellowstone National Park.	J. F. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 627, 1891.	Quartz-mica-diorite.	
NiO	0.05	Q 18.2 or 13.3 ab 34.1 an 18.3	di 2.9 hy 7.2 mt 3.3 il 0.9 hm 1.0	Electric Peak, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 627, 1891.	Quartz-pyroxene-mica-diorite.	
NiO	0.09	Q 11.2 or 11.1 ab 37.7 an 18.3	di 7.3 hy 8.5 mt 4.4 il 1.2	Electric Peak, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 627, 1891.	Pyroxene-mica-diorite.	
SO_3 Li_2O	0.63 0.01	Q 15.8 or 9.5 ab 29.3 an 25.3	di 3.1 hy 6.4 mt 2.6 il 3.2 hm 2.0	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 81, 1899.	Hornblende-porphyrite.	
SO_3 Cl Li_2O	trace 0.17 0.01	Q 10.5 or 7.2 ab 25.2 an 22.0	di 14.2 hy 11.3 mt 6.7 il 1.5	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 627, 1891.	Pyroxene-mica-diorite.	
SO_3	0.10	Q 14.4 or 13.9 ab 33.5 an 19.7	di 6.3 hy 3.1 mt 2.6 il 1.4 hm 2.6	Sepulchre Mountain, Yellowstone National Park.	T. M. Chatard.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 648, 1891.	Hornblende-pyroxene-andesite.	
Cr_2O_3	0.05	Q 9.6 or 16.1 ab 26.2 an 15.3	di 13.7 hy 7.4 mt 6.0 il 1.5 hm 1.8	Sepulchre Mountain, Yellowstone National Park.	T. M. Chatard.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 648, 1891.	Hornblende-pyroxene-andesite.	
SO_3 Cl Li_2O	trace none none	Q 10.0 or 10.0 ab 24.6 an 28.6	di 6.7 hy 11.1 mt 5.8 il 2.0	Sepulchre Mountain, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 648, 1891.	Pyroxene-andesite.	
		Q 11.7 or 18.9 ab 32.5 an 17.5	di 3.2 hy 9.7 mt 4.2 il 0.5	Near Hurricane Ridge, Yellowstone Nat. Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 261, 1899.	Andesite-porphyry.	
SO_3 Li_2O	0.29 0.05	Q 19.1 or 7.2 ab 33.5 an 19.7	di 1.8 hy 6.8 il 2.6 hm 4.5 tn 3.4	Agate Creek, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, B. U. S. G. S., 148, p. 134, 1897.	Pyroxene-andesite.	
Cr_2O_3 NiO SrO Li_2O	none none 0.10 none	Q 11.6 or 13.9 ab 33.5 an 23.9	di 2.8 hy 8.2 mt 3.0 il 0.8	Wind River Plateau, Yellowstone National Park.	H. N. Stokes.	Hague and Jaggar, B. U. S. G. S., 168, p. 97, 1900.	Hornblende-augite-andesite.	
NiO SrO Li_2O	none 0.11 trace	Q 12.2 or 16.1 ab 30.9 an 20.0	di 3.9 hy 9.3 mt 3.2 il 1.1	Cabin Creek, Yellowstone National Park.	H. N. Stokes.	Hague and Jaggar, B. U. S. G. S., 168, p. 96, 1900.	Diorite-porphyry.	
Cl FeS_2 SrO	0.04 0.90 trace	Q 21.4 or 8.3 ab 33.5 an 20.9	hy 10.9 mt 2.6 pr 0.9	North Mosquito Amphitheater, Leadville, Colo.	W. F. Hillebrand.	W. Cross, M. U. S. G. S., XII, p. 340, 1886.	Biotite-porphyrite.	
SO_3 SrO Li_2O	trace trace? trace	Q 14.8 or 11.1 ab 39.8 an 20.3	di 8.9 hy 0.7 mt 3.5 il 0.5	Henry Mountains, Utah.	R. B. Riggs.	J. S. Diller, B. U. S. G. S. 148, p. 183, 1897.	Porphyry.	
SrO Li_2O	0.12 trace	Q 14.9 or 13.3 ab 37.7 an 20.0	di 5.5 hy 3.4 mt 2.8 il 0.9	Mount Hillers, Henry Mountains, Utah.	W. F. Hillebrand.	W. Cross, 14 A. R. U. S. G. S., II, p. 227, 1894.	Hornblende-porphyrite.	
SrO Li_2O	0.07 trace	Q 10.6 or 16.7 ab 35.1 an 18.6	di 7.7 hy 3.2 mt 4.6 il 1.2	Ute Peak, Sierra El Late, Colorado.	W. F. Hillebrand.	W. Cross, 14 A. R. U. S. G. S., II, p. 227, 1894.	Hornblende-porphyrite.	Near andose.
SrO Li_2O	0.13 trace	Q 10.7 or 16.1 ab 33.5 an 23.1	di 6.3 hy 1.1 mt 4.6 il 1.1 ap 0.7	Lone Cone, San Miguel Mountains, Colorado.	W. F. Hillebrand.	W. Cross. 14 A. R. U. S. G. S., II, p. 227, 1894.	Augite-diorite.	Near andose.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
27	62.71	17.06	3.79	2.74	1.78	5.51	3.54	2.96	0.24					trace		100.33	2.79
A3. III	1.045	.167	.024	.038	.045	.098	.057	.032						—			30°
28	56.93	17.03	3.67	4.54	3.30	6.51	3.19	2.58	0.45	0.13	none	1.03	0.44	0.10	0.08	100.04	2.860
A1. I	.949	.167	.023	.063	.083	.116	.050	.027				.012	.003	.001	.001		33°
29	60.16	15.34	3.07	2.18	3.41	5.79	3.88	2.59	1.79	0.25		0.84	0.46	0.08	0.14	100.15	2.635
A1. I	1.003	.150	.020	.030	.085	.103	.063	.027				.010	.003	.001	.001		21°
30	62.78	17.16	1.96	2.31	2.32	4.84	4.11	2.15	0.88	0.24	none	0.56	0.15	0.06	0.04	99.58	
A1. I	1.046	.168	.012	.032	.058	.086	.066	.023				.007	.001	.001	—		
31	58.63	16.23	1.91	4.20	4.28	6.59	3.51	2.09	1.17	0.15	none	0.74	0.20	0.11	0.06	99.93	
A1. I	.977	.159	.012	.058	.107	.118	.057	.022				.009	.001	.002	—		
32	64.04	15.58	1.26	3.22	3.23	4.51	4.01	2.22	1.17	0.19	none	0.69	0.16	trace	0.11	100.39	
A1. I	1.067	.153	.008	.044	.081	.080	.064	.023				.009	.001	—	.001		
33	63.78	16.39	1.12	2.76	3.27	4.07	3.84	2.03	1.82	0.22	none	0.44	0.11	0.05	0.08	99.98	
A1. I	1.063	.161	.007	.039	.082	.073	.062	.021				.005	.001	.001	.001		
34	63.37	15.90	1.41	3.18	3.33	4.63	4.05	2.10	1.16	0.18	none	0.69	0.17	trace	0.06	100.23	
A1. I	1.056	.156	.009	.044	.084	.083	.065	.022				.009	.001	—	—		
35	57.21	12.99	3.28	10.18	1.59	5.97	3.07	1.61	1.03	0.68		1.72	0.44	0.24	0.06	100.20	
A1. I	.954	.127	.021	.141	.040	.107	.050	.017				.021	.003	.004	—		
36	62.09	17.03	2.38	2.69	3.08	5.65	4.10	1.67	0.13	0.04	none	0.65	0.19	trace	0.07	99.84	
A1. I	1.035	.167	.015	.038	.077	.101	.066	.018				.008	.001	—	.001		
37	60.98	17.82	1.83	3.33	2.76	5.73	4.26	1.43	0.45	0.13	none	0.71	0.17	trace	0.06	99.71	
A1. I	1.016	.174	.011	.046	.069	.102	0.69	.015				.009	.001	—	—		
38	60.09	17.85	2.03	3.45	3.50	6.28	4.17	1.31	0.26	0.12	none	0.54	0.23	trace	0.05	99.98	
A1. I	1.002	.175	.013	.049	.088	.112	.068	.014				.007	.002	—	—		
39	59.39	18.45	1.79	3.90	3.13	6.29	4.29	1.29	0.42	0.10	none	0.41	0.22	trace	0.05	99.77	
A1. I	.990	.181	.011	.054	.078	.112	.069	.014				.005	.002	—	—		
40	58.41	17.85	2.67	3.29	3.61	6.81	3.77	1.23	0.86	0.34	none	0.69	0.24	trace	0.05	99.87	
A1. I	.974	.175	.017	.046	.090	.121	.061	.013				.009	.002	—	—		
41	63.03	17.72	2.27	1.92	3.63	5.97	3.92	1.06	0.44							99.96	
A3. III	1.051	.173	.014	.027	.091	.107	.063	.012									
42	62.00	17.84	n. d.	4.40	2.64	5.37	4.29	1.47	1.66			0.17	0.29	trace		100.13	
A2. II	1.033	.175	—	.061	.066	.096	.069	.016				.002	.002	—			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 16.4 or 17.8 ab 29.9 an 22.2	di 4.2 hy 4.4 mt 5.6	Brush Creek, Elk Mountains, Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S., 150, p. 242, 1898.	Diorite.	
SO_3 Cl SrO Li_2O	none trace 0.06 none	Q 10.7 or 15.0 ab 26.2 an 25.0	di 3.9 hy 10.0 mt 5.3 il 1.8 ap 0.9	Ophir Needles, Telluride, Colorado.	H. N. Stokes.	W. Cross, B. U. S. G. S., 168, p. 163, 1900.	Gabbroitic facies of monzonite.	
SO_3 S NiO SrO Li_2O	0.08 trace trace 0.08 trace	Q 13.5 or 15.0 ab 33.0 an 16.7	di 7.2 hy 5.2 mt 4.6 il 1.5 ap 1.1	Sierra Grande, Colfax County, New Mexico.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 171, 1900.	Pyroxene-andesite.	
Cl S SrO Li_2O	trace 0.02 trace trace	Q 16.6 or 12.8 ab 34.6 an 22.0	di 1.7 hy 6.6 mt 3.0 il 1.1	Yentna River, Alaska.	H. N. Stokes.	J. E. Spurr, A. J. S., X, p. 310, 1900.	Yentnite.	Near yellowstonose.
FeS_2 SrO Li_2O	0.04 trace trace	Q 10.3 or 12.2 ab 29.9 an 22.2	di 6.4 hy 12.6 mt 2.8 il 1.4	Captain's Bay, Unalaska Island, Alaska.	W. F. Hillebrand.	G. F. Becker, B. U. S. G. S., 148, p. 232, 1897.	Diorite.	
S Cr_2O_3 NiO SrO Li_2O	trace none none trace trace	Q 17.4 or 12.8 ab 33.5 an 18.3	di 8.0 hy 10.2 mt 1.9 il 1.4	Mount Stuart, Kittitas County, Washington.	H. N. Stokes.	G. O. Smith, B. U. S. G. S., 168, p. 224, 1900.	Granodiorite.	
Cr_2O_3 NiO SrO Li_2O	none none trace trace	Q 18.0 or 11.7 ab 32.5 an 20.3 C 0.5	hy 11.7 mt 1.6 il 0.8	Near Mount Stuart, Kittitas County, Washington.	H. N. Stokes.	G. O. Smith, B. U. S. G. S., 168, p. 224, 1900.	Granodiorite-porphyry.	
S Cr_2O_3 NiO SrO Li_2O	trace none none none trace	Q 16.3 or 12.2 ab 34.1 an 18.9	di 8.5 hy 10.4 mt 2.1 il 1.4	Near Cascade Creek, Kittitas County, Washington.	H. N. Stokes.	G. O. Smith, B. U. S. G. S., 168, p. 224, 1900.	Granodiorite.	
FeS_2 Cr_2O_3 V_2O_3 SrO Li_2O	0.13 none none trace trace	Q 15.4 or 9.5 ab 26.2 an 16.7	di 8.9 hy 12.5 mt 4.9 il 3.2 ap 1.0	Turnpike Creek, Kittitas County, Washington.	W. F. Hillebrand.	G. O. Smith, B. U. S. G. S., 168, p. 225, 1900.	Diabase.	
SO_3 Cl Cr_2O_3 NiO SrO	none trace? none none 0.07	Q 15.3 or 10.0 ab 34.6 an 23.1	di 4.2 hy 7.6 mt 3.5 il 1.2	Palisades, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, B. U. S. G. S., 168, p. 223, 1900.	Hypersthene-augite-andesite.	
SO_3 Cl Cr_2O_3 NiO SrO	none trace none none 0.05	Q 13.5 or 8.3 ab 36.2 an 25.0	di 2.8 hy 9.0 mt 2.6 il 1.4	"The Watchman," Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, B. U. S. G. S., 168, p. 223, 1900.	Hypersthene-augite-andesite.	
SO_3 Cl S Cr_2O_3 NiO SrO	none trace none none 0.06 0.05	Q 11.3 or 7.8 ab 35.6 an 25.9	di 4.5 hy 10.5 mt 3.0 il 1.1	Crater Rim, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, B. U. S. G. S., 168, p. 222, 1900.	Hypersthene-augite-andesite.	
SO_3 Cl S Cr_2O_3 NiO SrO	none trace none none none 0.04	Q 10.0 or 7.8 ab 36.2 an 27.2	di 3.2 hy 11.3 mt 2.6 il 0.8	Wizard Island, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, B. U. S. G. S., 168, p. 222, 1900.	Hypersthene-augite-andesite.	
SO_3 Cl S Cr_2O_3 NiO SrO	none trace none none none 0.05	Q 11.9 or 7.2 ab 32.0 an 28.1	di 4.5 hy 9.5 mt 3.9 il 1.4	Llao Rock, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, B. U. S. G. S., 168, p. 223, 1900.	Hypersthene-augite-andesite.	
		Q 17.8 or 6.7 ab 33.0 an 27.2	di 2.3 hy 9.1 mt 3.2	West Base of Mount Shasta, California.	W. H. Melville.	J. S. Diller, B. U. S. G. S., 150, p. 228, 1898.	Hypersthene-andesite.	
		Q 12.6 or 8.9 ab 36.2 an 25.0	di 1.5 hy 13.9	Mount Shasta, California.	P. W. Shimer.	Hague and Iddings, A. J. S., XXVI, p. 230, 1883.	Hypersthene-andesite.	Pumice.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
43	61.58	16.96	1.75	2.85	3.67	6.28	3.94	1.28	1.06	0.24		0.49	0.22	trace	0.03	100.35	
A1. I	1.026	.166	.011	.040	.092	.112	.063	.014				.006	.002	—	—		
44	62.44	16.39	4.66	1.00	2.65	6.22	3.16	2.25	1.02	—		0.31	0.05	trace	0.03	100.18	
A1. I	1.041	.160	.029	.014	.066	.110	.051	.024				.004	—	—	—		
45	60.04	17.43	5.39	0.53	3.51	6.65	4.15	1.24	0.90	—		0.49	0.04	0.08	0.04	100.49	
A1. I	1.001	.171	.034	.007	.088	.119	.067	.014				.006	—	.001	—		
46	61.17	17.74	1.78	3.51	2.76	5.90	3.79	1.71	0.83	—		0.45	0.14	0.12	0.06	100.00	
A1. I	1.020	.174	.011	.049	.069	.105	.061	.018				.006	.001	.002	—		
47	60.93	18.56	2.68	2.19	2.37	6.63	3.79	1.33	0.90	—		0.61	0.18	0.10	0.02	100.41	
A1. I	1.016	.182	.017	.030	.059	.118	.061	.014				.008	.001	.001	—		
48	59.84	16.81	1.88	3.60	3.85	6.30	3.63	2.13	1.04	—		0.57	0.19	0.14	0.07	100.07	
A1. I	.998	.164	.012	.050	.096	.112	.058	.022				.007	.001	.002	.001		
49	63.47	16.75	2.15	2.75	3.04	5.72	3.94	1.62	0.55	—		0.37	0.13	0.09	0.04	100.66	
A1. I	1.058	.164	.014	.039	.076	.102	.063	.017				.005	.001	.001	—		
50	58.08	18.37	2.92	3.38	3.35	7.05	3.66	1.33	1.09	—		0.44	0.16	0.13	0.03	100.01	
A1. I	.968	.180	.018	.048	.084	.126	.059	.014				.006	.001	.002	—		
51	60.20	17.21	3.12	2.69	3.18	6.04	3.35	1.44	1.18	1.12		0.57	0.17	0.12	0.11	100.50	
A1. I	1.008	.169	.020	.038	.080	.108	.054	.015				.007	.001	.002	.001		
52	59.68	17.09	2.85	2.75	3.54	6.62	3.87	1.31	1.00	0.15	0.20	0.65	0.25	trace	0.04	100.03	
A1. I	.995	.167	.018	.039	.089	.118	.063	.014				.008	.002	—	—		
53	58.47	18.80	3.34	2.64	2.69	6.60	3.58	2.01	0.92	0.14		0.51	0.22	0.13	0.09	100.19	
A1. I	.975	.184	.020	.037	.067	.118	.058	.021				.006	.002	.002	.001		
54	63.43	14.20	1.54	4.56	2.35	5.51	3.49	2.19	1.50	0.15		0.73	0.11	0.03	0.06	99.85	
A1. I	1.057	.139	.010	.063	.059	.099	.056	.023				.009	.001	—	—		
55	60.02	16.07	2.17	3.46	4.57	7.01	3.55	1.59	0.45	0.24		0.42	0.17	0.10	0.08	99.96	
A1. I	1.000	.157	.014	.049	.114	.125	.057	.018				.005	.001	.001	.001		
56	59.34	17.61	3.63	2.28	3.50	6.45	3.40	1.94	0.74	0.64		0.32	0.25	0.12	0.11	100.37	
A1. I	.989	.172	.022	.032	.088	.115	.055	.020				.004	.002	.002	.001		
57	63.39	16.58	1.41	3.08	2.15	4.76	3.47	2.79	1.87	0.22		0.44	0.14	trace	0.11	100.41	
A1. I	1.057	.162	.009	.043	.054	.085	.056	.030				.005	.001	—	.001		
58	62.09	16.69	1.45	3.76	1.93	6.08	3.36	1.84	1.47	0.19		0.32	0.39	trace	0.10	99.77	
A1. I	1.035	.163	.009	.052	.048	.109	.054	.020				.004	.003	—	.001		
59	65.54	16.52	1.40	2.49	2.52	4.88	4.09	1.95	0.59	0.12		0.39	0.18	0.06	trace	100.73	
A1. I	1.092	.162	.009	.035	.063	.087	.066	.021				.005	.001	.001	—		
60	59.48	17.25	2.15	4.06	2.67	6.50	3.53	2.27	0.71	0.09		0.93	0.33	0.11	0.09	100.17	
A1. I	.991	.169	.014	.057	.067	.116	.057	.024				.011	.002	.002	.001		
61	57.41	17.71	2.16	5.01	3.38	6.73	3.12	1.82	1.14	0.20	none	1.04	0.24	0.15	0.09	100.26	
I	.964	.173	.014	.070	.085	.120	.050	.020				.012	.002	.002	.001		

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO trace Li_2O trace	Q 14.9 di 5.8 or 7.8 hy 9.2 ab 33.0 mt 2.6 an 24.7 il 0.9	Mount Shasta, California.	H. N. Stokes.	J. S. Diller, B. U. S. G. S., 148, p. 190, 1897.	Hornblende-andesite.	
SrO trace Li_2O trace	Q 19.8 di 5.4 or 13.3 hy 4.1 ab 26.7 mt 3.2 an 23.6 il 0.6 hm 1.8	Burney Butte, Shasta County, California.	R. B. Riggs.	J. S. Diller, B. U. S. G. S., 148, p. 195, 1897.	Pyroxene-andesite.	Dried at 105°.
SO_3 trace SrO ? Li_2O trace	Q 13.1 di 6.3 or 7.8 hy 5.9 ab 35.1 il 1.0 an 25.0 hm 5.4	Burney Creek, Shasta County, California.	R. B. Riggs.	J. S. Diller, B. U. S. G. S., 148, p. 195, 1897.	Hornblende-andesite.	Dried at 105°.
Cr_2O_3 none SrO 0.04 Li_2O trace	Q 14.7 di 2.4 or 10.0 hy 10.1 ab 32.0 mt 2.6 an 26.4 il 0.9	Crater Peak, n. Lassen Peak, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 197, 1897.	Hypersthene-andesite.	Dried at 110°.
SrO 0.12 Li_2O none	Q 16.6 di 2.6 or 7.8 hy 5.4 ab 32.0 mt 3.9 an 29.7 il 1.2	Tuscan Buttes, n. Lassen Peak, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 195, 1897.	Hornblende-andesite.	Dried at 105°.
Cr_2O_3 trace? SrO 0.02 Li_2O trace	Q 11.1 di 6.4 or 12.2 hy 10.5 ab 30.4 mt 2.8 an 33.4 il 1.1	Bailey Creek, Lassen Peak, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 197, 1897.	Hypersthene-andesite.	Dried at 110°.
SrO 0.04 Li_2O trace	Q 17.8 di 4.2 or 9.5 hy 8.2 ab 33.0 mt 3.2 an 23.4 il 0.8	Near Suppan's Mountain, Tehama County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 196, 1897.	Hypersthene-andesite.	Dried at 110°.
SrO 0.02 Li_2O trace	Q 11.3 di 4.5 or 7.8 hy 9.6 ab 30.9 mt 4.2 an 29.7 il 0.9	Suppans Mountain, Tehama County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 196, 1897.	Hypersthene-andesite.	Dried at 110°.
SrO trace Li_2O trace	Q 17.4 di 1.8 or 8.3 hy 8.7 ab 28.3 mt 4.6 an 27.8 il 1.1	Near Pilot Peak, Plumas County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 490, 1894.	Hornblende-andesite.	
SO_3 trace Cl 0.03 SrO trace Li_2O trace	Q 13.4 di 6.3 or 7.8 hy 7.6 ab 33.0 mt 4.2 an 25.0 il 1.2	Spanish Peak, Plumas County, California.	H. N. Stokes.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 724, 1896.	Quartz-diorite.	
SrO 0.05 Li_2O trace	Q 12.0 di 3.3 or 11.7 hy 6.5 ab 30.4 mt 4.6 an 29.2 il 0.9	Mount Ingalls, Plumas County, California.	W. F. Hillebrand.	H. W. Turner, J. G., III, p. 407, 1895.	Hornblende-pyroxene-andesite.	Also in 17 A. R. U. S. G. S., I, p. 731, 1896.
SrO trace Li_2O none	Q 19.3 di 9.2 or 12.8 hy 7.1 ab 29.3 mt 2.3 an 16.7 il 1.4	Near Bangor, Butte County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 482, 1894.	Granodiorite.	
SO_3 0.06 Cr_2O_3 trace SrO trace Li_2O none	Q 11.9 di 9.8 or 10.0 hy 10.7 ab 29.9 mt 3.2 an 22.8 il 0.8	Downieville, Sierra County, California.	H. N. Stokes.	H. W. Turner, J. G., III, p. 407, 1895.	Andesite (quartz-bearing).	
SrO 0.04 Li_2O trace	Q 14.0 di 4.2 or 11.1 hy 7.6 ab 28.8 mt 5.1 an 27.0 il 0.6	Poker Flat, Sierra County, California.	W. F. Hillebrand.	H. W. Turner, J. G., III, p. 407, 1895.	Hornblende-pyroxene-andesite.	Also in 17 A. R. U. S. G. S., I, p. 731, 1896.
	Q 17.5 di 2.1 or 16.7 hy 8.7 ab 29.3 mt 2.1 an 21.1 il 0.8	Grass Valley, Nevada County, California.	H. N. Stokes.	W. Lindgren, 17 A. R. U. S. G. S., II, p. 75, 1896.	Quartz-porphyrite.	
SO_3 0.10	Q 19.0 di 2.4 or 11.1 hy 8.8 ab 28.3 mt 2.1 an 24.7 il 0.6 ap 1.0	Nevada City, Nevada County, California.	H. N. Stokes.	W. Lindgren, 17 A. R. U. S. G. S., II, p. 59, 1896.	Hornblende-porphyrite.	
SrO trace Li_2O trace	Q 19.4 di 2.7 or 11.7 hy 7.7 ab 34.6 mt 2.1 an 20.9 il. 0.8	Ophir, Placer County, California.	W. F. Hillebrand.	W. Lindgren, 14 A. R. U. S. G. S., II, p. 255, 1894.	Granodiorite.	
SrO trace Li_2O trace	Q 11.9 di 6.3 or 13.8 hy 7.9 ab 29.9 mt 3.2 an 24.5 il 1.7	Donner Pass, Placer County, California.	W. F. Hillebrand.	W. Lindgren, B. U. S. G. S., 148, p. 212, 1897.	Granodiorite.	
FeS_2 none NiO 0.02 SrO 0.04 Li_2O trace	Q 11.5 di 3.9 or 11.1 hy 12.4 ab 26.2 mt 3.2 an 28.6 il 1.8	Tuolumne River, Amador County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 702, 1896.	Quartz-diorite-gneiss.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O -	H_2O	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
62	58.05	15.46	1.69	5.09	4.84	6.94	2.86	2.14	2.02	0.10	none	0.72	0.16	0.14	0.07	100.28	
A1. I	.968	.152	.011	.071	.121	.124	.047	.022				.009	.001	.002	.001		
63	62.62	17.51	0.49	4.06	2.84	5.49	3.49	1.76	0.92	0.22		0.55	0.12	0.05	trace	100.12	
A1. I	1.044	.172	.003	.057	.071	.098	.056	.019				.007	.001	.001	——		
64	58.09	17.46	1.12	5.08	4.06	6.24	2.94	2.02	1.45	0.29	0.21	0.95	0.17	none	0.07	100.37	
A1. I	.968	.171	.007	.071	.102	.111	.047	.022				.012	.001	——	.001		
65	61.05	18.30	3.49	1.11	2.59	7.75	4.06	1.36	0.71			0.09	trace	trace		100.51	2.668
A2. II	1.018	.179	.022	.015	.065	.138	.065	.015				.001	——	——			
66	63.13	16.00	4.34	1.52	2.07	4.45	3.87	2.65	2.00							99.54	
A3. III	1.051	.157	.027	.021	.052	.079	.063	.029									
67	60.91	18.08	2.40	3.85	3.54	5.56	4.16	1.01	0.71			0.33	trace			100.55	2.641
A2. II	1.015	.177	.015	.054	.089	.099	.067	.011				.004	——				
68	61.12	17.73	2.52	3.10	2.39	5.45	3.01	2.09	2.54							99.95	2.582
A3. III	1.019	.173	.015	.043	.060	.097	.048	.022									
69	62.74	13.67	3.39	4.35	1.74	6.01	4.25	1.23	2.02		none	trace	0.18	0.42		100.00	
A2. II	1.046	.134	.021	.061	.044	.107	.069	.013				——	.001	.006			
70	59.89	15.85	5.21	3.82	4.15	5.98	2.77	1.34	0.74	——	0.02	0.48	trace	0.12	0.03	100.53	
A1. I	.998	.155	.032	.053	.104	.107	.045	.014				.006	——	.002	——		
71	65.39	15.49	2.80	1.99	2.06	4.48	4.56	1.59	0.55				0.11			99.02	2.61
B3. IV	1.090	.152	.017	.028	.052	.080	.074	.017					.001				
72	63.56	15.43	3.02	2.43	2.55	4.33	4.02	2.41	1.09			0.95	0.17			100.01	
A2. II	1.059	.151	.019	.033	.064	.077	.064	.025				.012	.001				
73	63.36	16.35	2.12	3.05	3.28	4.79	3.58	2.92	0.99				0.13			100.57	
A3. III	1.056	.160	.013	.043	.082	.086	.058	.031					.001				
74	61.09	15.96	4.29	2.03	1.06	6.66	2.89	2.51	1.44			0.95	0.22			99.10	2.655
B2. III	1.018	.156	.027	.028	.027	.119	.047	.027				.012	.002				
75	61.04	15.72	5.03	2.15	3.61	5.34	4.02	2.66	0.58			0.45				100.60	
A3. III	1.017	.154	.031	.030	.090	.095	.064	.029				.006					
76	60.05	15.59	6.95	0.65	3.61	6.43	3.83	1.76	0.47			0.85	0.25			100.44	2.728
A2. II	1.001	.152	.044	.010	.090	.114	.061	.019				.010	.002				
77	60.32	16.92	5.88	1.40	3.52	5.64	3.83	2.42	0.44							100.37	
A3. III	1.005	.166	.036	.019	.087	.101	.061	.025									
78	57.91	16.45	6.55	2.32	4.59	3.73	3.59	1.61	1.70			0.37	0.41	0.06		99.36	2.932
A2. II	.965	.161	.041	.032	.115	.066	.058	.017				.004	.003	.001			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
FeS_2 NiO SrO Li_2O	none none trace trace	Q 11.0 or 12.2 ab 24.6 an 23.1	di 9.2 hy 13.3 mt 2.6 il 1.4	Sonora, Tuolumne County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 731, 1896.	Diorite.	
SrO Li_2O	trace trace	Q 16.9 or 10.6 ab 29.3 an 27.0	hy 13.3 mt 0.7 il 1.1	Chowchilla River, Mariposa County, California.	W. F. Hillebrand.	H. W. Turner, J. G., III, p. 403, 1895.	Quartz-mica-diorite.	Also in 17 A. R. U. S. G. S., I, p. 691, 1896.
SO_3 Cl F SrO Li_2O Org	0.05 0.02 trace 0.04 none 0.11	Q 11.2 or 12.2 ab 24.6 an 28.4	di 2.1 hy 16.0 mt 1.6 il 1.8	Yaqui Creek, Mariposa County, California.	G. Steiger.	H. W. Turner, B. U. S. G. S., 150, p. 342, 1898.	Quartz-mica-diorite.	
		Q 14.2 or 8.3 ab 34.1 an 27.5	di 8.5 hy 2.6 mt 3.5 hm 1.1	Santa Catalina Island, California.	W. S. T. Smith.	W. S. T. Smith, Pr. Cal. Ac. Sc. (3), Geol., I, No. 1, p. 41, 1897.	Pyroxene-andesite.	
		Q 18.2 or 16.1 ab 33.0 an 18.1	di 3.1 hy 3.8 mt 4.9 hm 1.0	Cross Spur Quarry, Washoe, Nevada.	R. W. Woodward.	G. F. Becker, M. U. S. G. S., III, p. 152, 1882.	Hornblende-mica-andesite.	Also in B. U. S. G. S., 17, p. 33, 1885.
		Q 13.6 or 5.1 ab 35.1 an 27.5	hy 13.4 mt 3.5 il 0.6	Mount Iztaccihuatl, Mexico.	A. Röhrig.	H. Lenk, Btr. G. Mex., II, p. 233, 1899.	Hornblende-andesite.	Near placerose.
		Q 19.0 or 12.2 ab 25.2 an 27.0 C 0.6	hy 9.7 mt 3.5	Old Providence Island, Caribbean Sea.	J. J. H. Teall.	T. G. Bonney, Min. Mag., VI, p. 42, 1886.	Hypersthene-andesite.	
S	trace	Q 18.5 or 7.2 ab 36.2 an 15.0	di 12.4 hy 3.6 mt 4.9	Island of Grenada, West Indies.	J. B. Harrison.	J. B. Harrison, Rocks of Grenada, London, 1896, p. 10.	Hornblende-andesite.	Average sample.
ZrO_2 Cl S CoO CuO Pb	none 0.06 none none 0.07 none	Q 19.3 or 7.8 ab 23.6 an 26.7	di 2.4 hy 11.2 mt 7.4 il 0.9	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. contrib.	Hornblende-porphyrite.	Dried at 100°.
		Q 20.4 or 9.5 ab 38.8 an 17.0	di 5.3 hy 4.4 mt 4.0	Cumbal Volcano, Colombia.	R. Küch.	R. Küch, G. Stud. Colomb., I, p. 167, 1892.	Pyroxene-dacite.	Sum low.
SO_3	0.05	Q 19.2 or 13.9 ab 33.5 an 17.2	di 3.3 hy 5.1 mt 4.4 il 1.8	Llanos de las Mesas, Mount Tajumbina, Colombia.	Fernandez.	R. Küch, G. Stud. Colomb., I, p. 125, 1892.	Pyroxene-hornblende-dacite.	
		Q 15.2 or 17.2 ab 30.4 an 19.7	di 3.5 hy 10.5 mt 3.1	Quebrada Chuchala Chiquita, Cerro Negro Mayasquer, Colombia.	Fischer.	R. Küch, G. Stud. Colomb., I, p. 186, 1892.	Pyroxene-hornblende-dacite.	
		Q 20.8 or 15.0 ab 24.6 an 22.8	di 5.8 wo 1.2 mt 3.7 il 1.8 hm 1.8	S'ma Virgen de Yanancal, Loma de Ales, Colombia.	Bragard.	R. Küch, G. Stud. Colomb., I, p. 145, 1892.	Hornblende-andesite.	Sum low.
		Q 12.8 or 16.1 ab 33.5 an 17.0	di 7.4 hy 5.6 mt 5.6 il 0.9 hm 1.1	Peñon de Pitayo, Colombia.	Schröder.	R. Küch, G. Stud. Colomb., I, p. 105, 1892.	Hornblende-andesite.	
		Q 14.7 or 10.6 ab 32.0 an 20.0	di 9.1 hy 4.8 il 1.5 hm 7.0	Quebrada del Molino, Azufral de Tuquerres, Colombia.	Bragard.	R. Küch, G. Stud. Colomb., I, p. 151, 1892.	Pyroxene-andesite.	
		Q 13.3 or 13.9 ab 32.0 an 22.2	di 4.5 hy 6.6 mt 4.4 hm 2.7	Chimborazo, Ecuador.	A. Schwager.	Schwager and Gümbel, Geogn. J'heft, Cassel, VII, p. 74, 1895.	Hornblende-andesite.	
S	0.07	Q 16.1 or 9.5 ab 30.4 an 18.3 C 2.0	hy 11.5 mt 6.5 il 0.6 hm 2.0	Don Pablo, Coquimbo, Chile.	F. v. Wolff.	F. v. Wolff, Z. D. G. G., LI, p. 502, 1899.	Augite-porphyrite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
[illegible]	[illegible]	[illegible]	4.74	[illegible]	2.89	3.51	5.06	2.11	1.99	0.81			0.05	trace		99.70	2.609
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.062	.081	.022					—	—			
[illegible]	[illegible]	[illegible]	5.34	2.40	3.84	4.98	3.25	2.74	2.23			0.69	0.25			99.31	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.089	.052	.029				.008	.002			99.71	
41	[illegible]	14.37	[illegible]	6.94	4.65	7.39	3.01	1.42	2.02					trace		100.11	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.116	.132	.048	.015						—			
42	[illegible]	[illegible]	[illegible]	[illegible]	1.46	5.23	3.31	2.15	4.15					trace		100.05	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.093	.053	.023						—			
[illegible]	[illegible]	[illegible]	[illegible]	3.95	4.24	6.87	2.98	1.08	1.25		0.30	trace	0.15	0.27		99.14	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.106	.123	.048	.012				—	.001	.004			
44	[illegible]	[illegible]	[illegible]	[illegible]	2.60	4.40	2.96	2.58	0.56	—	2.70	2.09	0.32	0.26		100.52	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.048	.027				.025	.002	.004			
45	[illegible]	[illegible]	[illegible]	[illegible]	4.30	5.40	4.04	1.93	2.69			0.68		0.29		100.05	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.108	[illegible]	.065	.020				.008		.004			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.40	6.70	2.54	1.47	1.11					0.36		100.80	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.120	.041	.016						.005			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.17	4.44	2.91	0.52				0.23			100.20	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.071	.031					.002				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.13	1.51	2.79		0.32	1.11	0.21			100.37	2.659
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.016				.013	.002				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.58	2.02		0.20	1.85	0.52			100.13	2.723
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.027				.023	.004				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.02		0.94	3.07	0.58	0.20		101.17	2.593
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.011				.038	.004	.003			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.31		0.46	3.46	0.57	0.21		99.90	2.446
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.012				.043	.004	.003			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.13	1.78		0.54	3.10	0.58	0.25		99.95	2.445
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.012				.038	.004	.004			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.04	1.10		0.52	3.69	0.51	0.27		100.15	2.522
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.011				.046	.003	.004		(100.05)	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.84	—		0.83	trace	trace		99.28	2.544
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				.010	—	—			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.72	0.25	0.15		0.22	0.22	trace		99.79	2.75
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				.003	.002	—			15°

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 11.5 or 12.2 ab 42.4 an 17.2	hy 7.2 mt 3.5 hm 2.2	Aconcagua, Argentina.	R. W. Gray.	T. G. Bonney, G. M., XXXVI, p. 4, 1899.	Hornblende-andesite.	Near dacose.
		Q 14.2 or 16.1 ab 27.2 an 18.6	di 4.8 hy 7.4 mt 5.8 il 1.2 hm 1.3	Average of British igneous rocks.	Various analysts.	A. Harker, G. M., XXXVI, p. 220, 1899.	———	Cf. Nos. 1, 2, 3. Sum incorrect.
		Q 11.3 or 8.3 ab 25.2 an 21.7	di 12.4 hy 16.8 mt 2.3	Eskdale Muir, Dumfries, Scotland.	Wilson.	J. J. H. Teall, Q. J. G. S., XL, p. 227, 1884 (quoted).	Andesitic basalt.	Also in Brit. Petr., p. 196, 1888.
		Q 16.6 or 11.8 ab 27.8 an 25.9 C 0.4	hy 5.3 mt 7.2	Beinn More, Island of Mull, Scotland.	G. H. Perry.	J. W. Judd, Q. J. G. S., XLVI, p. 349, 1890.	Propylite.	Not fresh.
S	0.19	Q 16.4 or 6.7 ab 25.2 an 22.2	di 9.5 hy 8.5 mt 8.6	Great Ayton, England.	W. F. K. Stock.	J. J. H. Teall, Q. J. G. S., XL, p. 224, 1884.	Andesite.	Sum low.
		Q 20.9 or 15.0 ab 25.2 an 21.7	hy 6.5 il 3.9 hm 6.5	Gräflasian, Rödö, Sweden.	H. Santesson.	P. J. Holmquist, Afv. Sv. G. und., No. 181, p. 73, 1899.	Porphyrite.	Not fresh.
		Q 9.8 or 11.1 ab 34.1 an 19.2	di 5.9 hy 9.1 mt 6.5 il 1.2	Svanken, Rödö, Sweden.	H. Santesson.	P. J. Holmquist, Afh. Sv. G. Und., No. 181, p. 63, 1899.	Syenite-porphyry.	Not fresh. Near andose.
		Q 26.0 or 8.9 ab 21.5 an 26.4	di 5.7 hy 7.8 mt 3.0	Löytökorpi, Kankaanpää, Finland.	H. Berghell.	J. J. Sederholm, B. C. G. Finl., 6, p. 74, 1897.	Porphyroid.	Metamorphosed. Near bandose.
SO_3	0.19	Q 11.5 or 17.2 ab 37.2 an 18.1	di 2.5 hy 12.5 mt 0.5	Zwingenberg, Melibocus Mountains, Hesse.	Heurich.	A. Osann, Mit. Bad. G. L-A., II, p. 385, 1893.	Malchite.	SO_3 for S.
SO_3 Org	0.16 0.01	Q 13.3 or 8.9 ab 26.2 an 23.6	di 7.0 hy 12.5 mt 3.2 il 2.0	Kronweiler, Rh. Prussia.	Böttcher.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 290, 1892.	Bronzite-porphyrite-pitchstone.	
SO_3	0.77	Q 11.8 or 15.0 ab 33.5 an 18.3	di 1.6 hy 8.4 mt 3.5 il 3.5 ap 1.2	Staffelhof, Nahe River, Rh. Prussia.	K. Grense.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 309, 1892.	Augite-porphyrite.	
F	0.05	Q 29.5 or 6.1 ab 30.4 an 19.7 C 0.3	hy 2.8 il 2.0 hm 4.6 ru 2.1	Froschberg, Siebengebirge, Rh. Prussia.	von Reis.	W. Hocks, Jb. Pr. G. L-A., XII, p. 16*, 1893.	Andesite.	Sum high. TiO_2 high?
F	0.05	Q 27.0 or 6.7 ab 32.5 an 18.3	hy 2.6 il 2.3 hm 5.7 ru 2.3	Froschberg, Siebengebirge, Rh. Prussia.	von Reis.	W. Hocks, Jb. Pr. G. L-A., XII, p. 16*, 1893.	Andesite.	TiO_2 high?
F	0.05	Q 26.5 or 6.7 ab 32.0 an 19.2	hy 2.8 il 2.3 hm 5.3 ru 1.9	Froschberg, Siebengebirge, Rh. Prussia.	von Reis.	W. Hocks, Jb. Pr. G. L-A., XII, p. 16*, 1893.	Andesite.	TiO_2 high?
F	0.05	Q 24.1 or 6.1 ab 34.1 an 21.7	hy 2.6 tn 3.6 il 1.8 hm 5.0 ru 1.3	Froschberg, Siebengebirge, Rh. Prussia.	von Reis.	W. Hocks, Jb. Pr. G. L-A., XII, p. 16*, 1893.	Andesite.	TiO_2 high?
		Q 13.4 or 12.2 ab 33.5 an 18.3 C 1.4	hy 9.6 mt 8.1 il 1.5	Lauterbach Thal, Siebengebirge, Rh. Prussia.	E. Kaiser.	E. Kaiser, Vh. Nh. Ver. Bonn, LIV; p. 178, 1897.	Andesite.	Sum low. Dried at 125°.
		Q 18.4 or 10.0 ab 26.2 an 25.3 C 0.9	hy 10.1 mt 1.6 hm 6.4	Galgenberg, Hesse.	Not stated.	Chelius & Klemm, Erl. G. Kte. Hesse, III, p. 8, 1894.	Hornblende-granite.	Iron oxides?

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
96	57.85	17.20	5.04	1.53	2.81	6.69	3.21	2.26	2.00		0.85	0.83	0.15			100.56	2.676
A2. II	.964	.167	.031	.021	.070	.120	.051	.024				.010	.001				
97	59.60	14.30	1.49	6.43	1.49	4.54	2.90	1.84	4.63		2.02	1.12	0.24			100.81	2.646
A2. II	.993	.140	.009	.089	.037	.080	.047	.020				.013	.002				
98	59.32	13.33	1.36	7.32	1.79	4.37	2.58	2.30	3.34		2.91	1.04	0.18			100.00	2.736
A2. II	.989	.130	.009	.101	.045	.078	.042	.024				.012	.001				
99	56.69	14.99	3.39	4.38	3.39	5.92	3.30	2.05	3.43		1.00	1.34	0.22			100.25	2.67
A2. II	.945	.147	.021	.061	.085	.105	.053	.022				.017	.002				
100	61.40	19.98	1.28	4.08	3.67	4.43	2.21	1.33	1.44							99.82	
A3. III	1.023	.196	.008	.057	.092	.078	.035	.014									
101	60.84	18.75	1.40	3.48	1.95	5.32	2.88	2.13	3.15			0.29				100.19	
A3. III	1.014	.184	.009	.049	.049	.094	.047	.022				.004					
102	66.91	15.20	n. d.	6.45	2.35	3.73	3.33	0.86	0.16							98.99	2.724
C4. V	1.115	.149	—	.090	.059	.066	.054	.009									19°
103	62.27	16.92	2.40	2.59	2.87	4.78	4.72	1.47	1.22			0.16	trace			99.47	2.584
B2. III	1.038	.166	.015	.036	.072	.086	.076	.016				.002	—				22°
104	60.63	16.96	2.87	2.31	3.27	6.41	3.58	2.44	1.98							100.45	2.594
A3. III	1.011	.166	.018	.032	.082	.114	.058	.026									22°
105	60.39	16.96	1.50	3.42	3.81	5.41	3.37	2.01	3.03			0.21	trace			99.11	2.580
B2. III	1.007	.166	.009	.048	.095	.096	.055	.021				.003					22°
106	59.29	15.27	5.21	2.08	4.42	6.15	3.31	2.61	1.46				0.18			100.02	2.614
A3. III	.988	.150	.032	.030	.111	.110	.053	.027					.001				22°
107	63.18	14.64	1.50	5.18	2.26	7.69	2.48	1.57	0.21				1.36	0.41		100.48	
A3. III	1.053	.144	.009	.072	.057	.137	.040	.017					.010	.006			
108	59.27	14.55	2.02	7.17	3.50	7.76	2.88	1.62	0.36				0.91	0.32		100.36	
A3. III	.971	.143	.013	.100	.088	.138	.047	.017					.006	.005			
109	62.02	15.15	2.08	1.96	3.15	5.52	3.18	1.66	4.57							99.29	
B3. IV	1.034	.149	.013	.028	.079	.098	.051	.018									
110	59.94	15.52	2.53	2.00	3.62	6.76	4.46	1.29	3.35							99.47	
A3. III	.999	.152	.016	.028	.091	.121	.072	.014									
111	63.61	17.64	1.81	2.09	3.19	5.22	4.70	1.28	0.57							100.11	
A3. III	1.060	.173	.011	.030	.080	.093	.076	.014									
112	61.90	17.28	1.70	5.76	2.76	4.68	2.52	1.80	1.30							99.70	
A3. III	1.032	.169	.011	.080	.069	.084	.040	.019									
113	61.29	17.68	6.03	0.30	2.45	5.61	4.28	1.38	0.96			0.65				100.63	2.440
A3. III	1.022	.173	.038	.004	.061	.100	.069	.015				.008					

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

Inclusive.		Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3	0.14	Q 13.9 di 6.1 or 13.3 hy 4.2 ab 26.7 mt 2.6 an 25.6 il 1.5 hm 3.2	Himmelberg, Blatt Lebach, Prussia.	Hampe.	Weiss and Grebe, Erl. G. Kte. Pr., Bl. Lebach, p. 34, 1889.	Bronzite-porphyrite.	SO_3 for S.
SO_3 Org	0.19 0.02	Q 20.0 di 1.6 or 11.1 hy 11.8 ab 24.6 mt 2.1 an 20.3 il 2.0	Niederbrombach, Oberstein, Harz Mountains.	Böttcher.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 293, 1892.	Augite-porphyrite.	Not fresh. SO_3 for S.
SO_3 Org	0.14 0.02	Q 20.2 di 5.6 or 18.3 hy 12.2 ab 22.0 mt 2.1 an 15.0 il 1.8	Bielstein, Rübeland, Harz Mountains.	Gremse.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 290, 1892.	Quartz-augite-porphyrite.	Not fresh. SO_3 for S.
SO_3	0.15	Q 12.6 di 8.1 or 12.2 hy 7.8 ab 27.8 mt 4.9 an 19.5 il 2.5	Werschweiler, St. Wendel, Harz Mountains.	Böttcher.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 266, 1892.	Diorite-porphyry.	Not fresh. SO_3 for S.
		Q 25.9 hy 15.7 or 7.8 mt 1.9 ab 18.3 an 21.7 C 7.0	Bärenstein, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 211, 1899.	Diorite.	Near bandose. Not fresh.
		Q 19.4 hy 10.2 or 12.2 mt 2.1 ab 24.6 il 0.6 an 26.1 C 2.1	Wolfsgrube, Ursulaberg, Carinthia.	Not stated.	H. v. Foullon, Vh. Wien. G. R-A., XXIII, p. 93, 1889.	Quartz-mica-porphyrite.	
		Q 27.4 hy 17.8 or 5.0 ab 28.3 an 18.3 C 2.0	Lake Avio, Adamello Mountains, Tyrol.	v. Rath.	v. Rath, Z. D. G. G., XVI, p. 247, 1864.	Tonalite.	Low sum due to nondetermination of Fe_2O_3?
Cl	0.07	Q 14.0 di 2.7 or 8.9 hy 8.7 ab 39.8 mt 3.5 an 20.6	Punta della Civitate, Capraia Island, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 142, 1893.	Andesite.	Sum low.
		Q 12.9 di 7.3 or 14.5 hy 6.4 ab 30.4 mt 4.2 an 22.8	Poppa alla Nave, Capraia Island, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 141, 1893.	Andesite.	
Cl	trace	Q 13.9 di 1.6 or 11.7 hy 15.5 ab 28.8 mt 2.1 an 25.0	Monte Patello, Capraia Island, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 141, 1893.	Andesite.	Sum low.
Cl	0.04	Q 13.0 di 8.7 or 15.0 hy 7.1 ab 27.8 mt 7.3 an 19.5	Capraia Island, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 142, 1893.	Andesite.	
		Q 23.8 di 4.6 or 9.5 hy 11.7 ab 21.0 mt 2.1 an 24.2 ap 3.2	Lava of 1888, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 110, 1892.	Andesite.	
		Q 12.9 di 9.5 or 9.5 hy 15.2 ab 24.6 mt 3.0 an 22.0 ap 2.0	Lava of 1888, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 110, 1892.	Andesite.	
		Q 20.9 di 4.0 or 10.0 hy 8.1 ab 26.7 mt 3.0 an 22.2	Dubowka, Mariupol, Russia.	J. Morozewicz.	J. Morozewicz, cf. N. J., 1900, I, p. 394.	Hornblende-andesite.	Sum low.
		Q 11.6 di 12.1 or 7.8 hy 5.0 ab 37.7 mt 3.7 an 18.3	Mokraya Wolnowacha, Mariupol, Russia.	J. Morozewicz.	J. Morozewicz, cf. N. J., 1900, I, p. 394.	Hornblende-andesite.	
		Q 14.7 di 2.3 or 7.8 hy 9.4 ab 39.8 mt 2.6 an 23.1	Tschchera River, Caucasus Mountains.	L.-Lessing and Krikmeyer.	Loewinson-Lessing, cf., N. J., 1899, II, p. 237.	Andesite-dacite.	
		Q 22.3 hy 16.1 or 10.6 mt 2.6 ab 21.0 an 23.4 C 2.7	Kasbek, Caucasus Mountains.	L.-Lessing and Krikmeyer.	Loewinson-Lessing, cf., N. J., 1899, p. 237.	Andesite-dacite.	
		Q 16.3 di 2.3 or 8.3 hy 5.0 ab 36.2 il 0.6 an 24.7 hm 6.0	Anzeiou, Ægina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende-dacite.	Iron oxides?

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
114	59.94	18.40	3.69	2.99	1.95	6.58	3.43	1.67	0.94			0.02				99.61	2.440
A3. III	.982	.180	.023	.042	.049	.118	.055	.018				—					
115	59.83	17.82	3.62	4.60	1.64	6.88	3.31	1.23	0.52			0.01				99.44	2.635
A3. III	.997	.174	.023	.064	.041	.123	.053	.014				—					
116	55.46	16.76	5.15	3.00	2.44	10.00	2.94	1.95	1.60			0.21				99.51	2.610
A3. III	.918	.164	.032	.042	.061	.179	.047	.022				.003					
117	56.58	14.88	2.31	3.04	3.76	8.69	3.36	2.18	1.43	0.69	2.32	0.77	0.15	0.16	0.07	100.39	
A1. I	.943	.146	.014	.042	.094	.155	.054	.023				.010	.001	.002	.001		
118	61.93	16.45	4.66	0.40	2.94	4.40	4.03	2.20	2.50							99.51	2.539
A3. III	1.032	.161	.029	.006	.074	.079	.065	.023									15°
119	55.25	12.12	8.84	4.91	4.84	8.34	2.08	1.62	1.65							99.65	
A3. III	.921	.119	.055	.068	.121	.149	.034	.017									
120	61.50	16.79	3.48	2.23	1.96	5.44	4.78	2.38	trace	0.36	trace			1.22		100.14	2.727
A3. III	1.025	.164	.022	.030	.049	.096	.077	.025						.017			15°

RANG 3. ALKALICALCIC. TONALASE.

1	60.61	16.61	1.97	5.09	3.10	4.46	3.11	0.25	2.45		1.57					99.22	
B3. IV	1.010	.163	.012	.071	.078	.079	.050	.003									
2	60.40	16.89	1.88	3.72	3.82	7.25	3.80	0.77	0.20	0.09	none	0.61	0.16	0.12	0.06	99.87	
A1. I	1.007	.165	.012	.052	.096	.129	.061	.008				.008	.001	.002	—		
3	64.67	16.62	0.51	0.76	2.26	9.50	4.10	0.34	0.37	0.08		0.51	0.12	trace	0.02	99.86	
A1. I	1.078	.163	.003	.011	.047	.169	.066	.003				.006	.001	—	—		
4	60.09	16.43	2.28	3.01	4.37	5.76	4.52	0.70	1.16	0.20	0.07	0.63	0.12	0.12	trace	99.80	
A1. I	1.002	.161	.014	.042	.109	.103	.072	.007				.008	.001	.002	—		
5	61.37	15.41	3.15	3 89	3.48	4.42	3.76	0.34	2.70	0.29		0.60	0.08	0.47	0.08	100.04	
A1. I	1.023	.151	.020	.054	.087	.078	.060	.003				.007	.001	.007	.001		
6	63.82	16.53	1.28	2.93	1.99	5.57	4.12	0.77	1.82		1.10	trace		trace		99.93	2.689
A3. III	1.064	.162	.008	.040	.050	.100	.066	.008				—		—			
7	64.22	16.36	2.93	2.50	1.94	5.85	3.96	0.73	0.84			0.21	trace			99.54	2.598
A3. III	1.070	.160	.018	.035	.049	.104	.064	.008				.003	—				
8	57.56	13.83	2.46	3.63	4.67	7.27	3.96	0.48	2.66	—	3.50	0.17	trace	trace		100.19	
A2. II	.959	.135	.015	.050	.117	.130	.064	.005				.002	—	—			
9	56.63	17.01	6.15	2.80	4.08	6.83	4.48	0.25	1.17	—	0.02	0.18	0.28	0.05	none	100.02	
A1. I	.944	.164	.039	.039	102	.121	.072	.003				.002	.002	.001	—		
10	59.56	16.10	6.28	3.02	3.08	6.32	3.09	0.80	0.44				0.18	1.80		100.67	
A3. III	.993	.158	.039	.042	.077	.112	.055	.008					.001	.023			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 14.8 di 2.7 or 10.6 hy 5.6 ab 28.8 mt 5.3 an 29.5	Kaimeni, Methana, Greece.	A. Röhrig.	H. S. Washington, J.G., III, p. 150, 1895.	Hornblende-hypersthene-andesite.	
	Q 17.0 di 3.7 or 7.8 hy 7.7 ab 27.8 mt 5.3 an 29.7	Mount Chelona, Methana, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hypersthene-andesite.	
	Q 9.5 di 15.6 or 12.2 wo 1.6 ab 24.6 mt 7.4 an 26.4	Mount Chondos, Ægina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende-augite-andesite.	Near andose.
	Q 9.3 di 19.1 or 12.8 hy 2.6 ab 28.3 mt 4.7 an 19.2	Mytilene Island, Ægean Sea.	T. M. Chatard.	J. S. Diller, B. U. S. G. S., 79, p. 29, 1891.	Quartz-basalt.	Near andose.
	Q 16.7 di 1.3 or 12.8 hy 6.8 ab 34.1 mt 1.4 an 20.3 hm 3.7	Acropolis, Pergamon, Asia Minor.	R. Lepsius.	R. Lepsius, Geol. v. Attika, Berlin, 1893, p. 169.	Biotite-dacite.	
	Q 15.8 di 17. or 9.5 hy 5.6 ab 17.8 mt 12.8 an 18.9	Richmond, Cape Colony.	Feder.	E. Cohen, N. J. B. B. V., p. 240, 1887.	Quartz-dialase.	
	Q 11.9 di 7.6 or 13.9 hy 2.3 ab 40.3 mt 5.1 an 17.2	Mount Lambie, Rydal, New South Wales.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XVI., p. 44, 1883.	Quartz-porphyry.	

SUBRANG 5. PERSODIC. PLACEROSE.

	Q 23.8 hy 15.6 or 1.7 mt 2.8 ab 26.2 an 22.0 C 3.2	Ely, Minnesota.	G. F. Sidener.	N. H. Winchell, 23 A. R. G. Nh. S. Minn., p. 204, 1895.	Felsite.	
FeS_2 0.08 NiO 0.02 SrO trace Li_2O trace	Q 14.3 di 7.6 or 4.4 hy 10.2 ab 32.0 mt 2.8 an 26.7 il 1.1	St. Augustine Volcano, Cook Inlet, Alaska.	W. F. Hillebrand.	G. F. Becker, 18 A. R. U. S. G. S., III, p. 52, 1898.	Augite-bronzite-andesite.	
SrO trace Li_2O trace	Q 21.1 di 11.1 or 1.7 wo 3.0 ab 34.6 mt 0.7 an 26.1 il 0.9	English Mountain, Placer County, California.	W. F. Hillebrand.	W. Lindgren, B. U. S. G. S., 148, p. 212, 1897.	Augite-granite.	
SO_3 trace FeS_2 0.34 SrO trace Li_2O none	Q 12.8 di 4.8 or 3.9 hy 11.3 ab 37.7 mt 3.2 an 22.8 il [illegible]2	Ophir, Placer County, California.	W. F. Hillebrand.	W. Lindgren, 14 A. R. U. S. G. S., II, p. 262, 1894.	Dike rock, allied to camptonite.	
SrO trace Li_2O none	Q 21.9 hy 12.8 or 1.7 mt 4.6 ab 31.4 il 1.1 an 21.7 C 1.0	Jenny Lind, Calaveras County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 473, 1894.	Porphyrite.	
	Q 21.0 di 2.8 or 4.4 hy 7.8 ab 34.6 an 24.5 mt 1.9	Pebbly Beach, Santa Catalina Island, California.	W. S. T. Smith.	W. S. T. Smith, Pr. Cal. Ac. Sc., Geol. I, p. 25, 1897.	Porphyrite.	
	Q 22.8 di 3.7 or 4.5 hy 5.4 ab 33.5 mt 4.2 an 24.5	Xico Island, Lake Chalco, Mexico.	A. Röhrig.	H. Lenk, Btr. G. Mex., II, p. 233, 1899.	Hornblende-andesite.	Bomb.
S none	Q 11.5 di 15.4 or 2.8 hy 9.0 ab 33.5 mt 3.5 an 18.3	Caman's, Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Dist. p. 12, 1898.	Diabase.	Not fresh. Dried at 100°.
ZrO_2 trace Cl 0.06 S none CoO none Cu 0.04 Pb none	Q 10.9 di 6.9 or 1.7 hy 7.0 ab 37.7 mt 9.0 an 24.7	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. Contrib.	Mica-diorite.	Dried at 100°.
	Q 19.7 di 3.8 or 4.4 hy 6.3 ab 28.8 mt 9.0 an 26.4	Bandai San, Japan.	Shimidzu.	T. Wada, Mt. D. Ges. Ostas., V., p. 74, 1889.	Augite-andesite.	MnO high? Alkalies corr. cf. N. J., 1890, II, p. 102.

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. BANDASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	56.42	16.81	3.26	6.92	3.50	5.64	1.21	3.07	2.25				1.08	0.23		100.39	2.625
A3. III	.940	.165	.020	.096	.088	.101	.019	.033					.008	.003			
2	55.48	19.61	4.06	6.05	3.06	8.75	0.15	1.94	1.18							100.28	
A3. III	.925	.192	.025	.085	.077	.156	.002	.021									

RANG 4. DOCALCIC. BANDASE.

1	54.61	15.23	3.51	4.80	4.69	7.41	1.46	2.70	2.47	0.32	1.46	0.86	0.35	0.09	0.11	100.11	
A1. I	.910	.149	.022	.067	.117	.132	.023	.029				.011	.003	.001	.001		
2	56.44	16.17	7.72	3.00	2.02	10.13	1.17	1.18	2.37					0.30		100.50	
A3. III	.941	.158	.049	.042	.051	.180	.019	.013						.004			
3	60.50	15.95	6.27	2.89	3.82	6.51	1.65	2.24	0.84							100.67	2.69
A3. III	1.008	.156	.039	.040	.096	.116	.027	.023									
4	59.55	18.08	2.15	3.13	1.40	9.36	1.53	2.06	2.27				0.39	0.24		100.51	
A3. III	.993	.177	.014	.043	.035	.168	.024	.022					.003	.003			
5	57.69	17.43	0.94	4.09	4.80	7.18	1.69	3.06	2.83				0.43	0.18		100.32	
A3. III	.962	.170	.006	.057	.120	.128	.030	.033					.003	.002			
6	60.50	15.05	1.43	6.07	3.11	8.61	1.83	2.02	0.21				1.12	0.34		100.29	
A3. III	1.008	.147	.009	.085	.078	.153	.030	.021					.008	.005			
7	51.15	15.92	9.34	2.87	6.48	10.40	1.19	1.61	0.11			0.44	0.06	0.09		99.66	
A2. II	.853	.156	.058	.040	.162	.185	.019	.017				.006	—	.001			
8	63.41	16.50	2.53	3.36	2.74	5.80	1.90	2.26	1.55				0.10	trace		100.15	2.498
A3. III	1.057	.161	.015	.047	.069	.103	.030	.024					.001	—			

RANG 4. DOCALCIC. BANDASE.

1	58.57	16.10	2.89	6.12	2.33	7.39	2.11	1.01	1.27	0.21	none	1.41	0.37	0.18	trace	100.07	
A1. I	.976	.158	.018	.085	.058	.132	.034	.011				.018	.003	.002			
2	56.41	15.19	1.60	6.24	7.18	6.77	2.21	1.34	2.00	0.08		0.69	0.05	0.11		100.06	
A1. I	.940	.149	.010	.087	.180	.121	.035	.014				.009	—	.002			
3	55.97	15.60	1.21	6.28	6.83	7.31	2.23	1.25	1.85	0.18		1.11	0.16	0.08		100.10	
A1. I	.933	.153	.007	.088	.171	.130	.036	.014				.013	.001	.001			
4	55.16	17.51	2.62	5.83	4.35	8.50	1.83	1.08	2.01	0.18	none	0.64	0.21	0.15	trace	100.17	
A1. I	.919	.172	.016	.081	.109	.151	.029	.012				.008	.002	.002	—		
5	52.94	14.70	2.52	7.80	4.49	6.56	3.09	0.04	2.04		4.86					99.04	
B3. IV	.882	.144	.016	.108	.112	.117	.050	—									
6	52.31	18.35	5.90	11.06	1.00	7.33	2.90	0.49	0.35							99.69	
A3. III	.872	.180	.037	.154	.025	.130	.047	.005									

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 1. PREPOTASSIC. SAGAMOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 15.7 hy 18.8 or 18.3 mt 4.6 ab 10.0 an 28.1 C 1.2	Monte Rado, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Ak., p. 119, 1888.	Augite-andesite.	Also in N. J. B. B., VI, p. 33, 1889.
	Q 22.1 hy 15.6 or 11.7 mt 5.8 ab 1.0 an 43.4	Hokizawa, Sagami, Japan.	Not stated.	T. Harada, Die. Jap. Inseln. Berlin, 1890, p. 118.	Tonalite.	

SUBRANG 2. SODIPOTASSIC.

ZrO_2 none SO_3 none Cl none SrO 0.04 Li_2O trace	Q 13.6 di 7.9 or 16.1 hy 12.5 ab 12.1 mt 5.1 an 27.0 il 1.5	Zosel District, Daylight, Montana.	H. N. Stokes.	W. H. Weed, B. U. S. G. S. 168, p. 119, 1900.	Andesite-porphyry.	Not fresh.
	Q 23.5 di 11.5 or 7.2 mt 9.7 ab 10.0 hm 1.1 an 35.0	Koijärvi, Urjala, Finland.	A. W. Forsberg.	J. J. Sederholm, Finl. G. Und. Bl., 18, p. 49, 1890.	Uralite-porphyry.	Also in T. M. P. M., XII, p. 120, 1891.
	Q 23.4 di 2.2 or 12.8 hy 8.6 ab 14.1 mt 9.2 an 29.5	Unkersdorf, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII, p. 752, 1886.	Augite-hornblende-porphyrite.	
SO_3 0.35 Cl trace	Q 21.2 di 8.7 or 12.2 hy 3.0 ab 12.6 mt 3.2 an 36.4	Monte Cimino, Viterbo, Italy.	L. Ricciardi.	A. Verri, B. Soc. G. Ital., VIII, p. 403, 1889.	Andesite.	Alkalies?
SO_3 trace	Q 10.7 di 4.9 or 18.3 hy 16.4 ab 15.7 mt 1.4 an 29.7	Monte Cimino, Viterbo, Italy.	L. Ricciardi.	A. Verri, B. Soc. G. Ital., VIII, p. 403, 1889.	Andesite.	Alkalies?
	Q 19.4 di 7.7 or 11.7 hy 14.1 ab 15.7 mt 2.1 an 26.7 ap 2.5	Lava of 1888, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 110, 1892.	Andesite.	
	Q 10.2 di 14.1 or 9.5 hy 9.7 ab 10.0 mt 7.9 an 33.4 il 0.9 hm 3.5	Seven Pagodas, Chingelput, Madras, India.	P. Brühl.	T. H. Holland, Rec. G. S. India, XXX, p. 35, 1897.	Augite-diorite.	Nearly in salfemane. Also in Q. J. G. S., LIII, p. 409, 1897.
	Q 25.6 hy 11.1 or 13.3 mt 3.5 ab 15.7 an 28.6 C 0.4	Singalang Volcano, Sumatra.	K. Sillib.	A. Merian, N. J. B. B., III, p. 302, 1885.	Hypersthene-andesite.	

SUBRANG 3. PRESODIC. BANDOSE.

ZrO_2 0.09 Cr_2O_3 none V_2O_3 0.02 NiO trace SrO trace	Q 21.3 di 4.5 or 6.1 hy 10.0 ab 17.8 mt 4.2 an 31.4 il 2.8	Stone Run, Cecil County, Maryland.	W. F. Hillebrand.	A. G. Leonard, B. U. S. G. S., 168, p. 45, 1900.	Quartz-diorite.	
ZrO_2 0.14 Cr_2O_3 0.05	Q 10.6 di 4.8 or 7.8 hy 24.8 ab 18.3 mt 2.3 an 27.8 il 1.4	Georgetown, District of Columbia.	W. F. Hillebrand.	G. H. Williams, 15 A. R. U. S. G. S., p. 673, 1895.	Biotite-diorite.	
Cr_2O_3 0.04 Li_2O trace	Q 9.7 di 6.0 or 7.8 hy 23.1 ab 18.9 mt 1.6 an 28.6 il 2.0	Triadelphia, Montgomery County, Maryland.	W. F. Hillebrand.	G. H. Williams, 15 A. R. U. S. G. S., p. 673, 1895.	Biotite-diorite.	
ZrO_2 0.02 FeS_2 0.03 Cr_2O_3 trace V_2O_3 0.04 NiO 0.01 SrO trace	Q 13.5 di 4.6 or 6.7 hy 16.2 ab 15.2 mt 3.7 an 36.4 il 1.2	Octoraro Creek, Cecil County, Maryland.	W. F. Hillebrand.	A. G. Leonard, B. U. S. G. S., 168, p. 45, 1900.	Quartz-diorite.	
	Q 10.0 di 5.3 or none hy 20.8 ab 26.2 mt 3.7 an 26.1	Ely, Minnesota.	C. F. Sidener.	N. H. Winchell, 23 A. R. G. Nh. S., Minn., p. 204, 1895.	Felsite.	Sum low. Not fresh.
	Q 9.7 hy 17.9 or 2.8 mt 8.6 ab 24.6 an 35.6	Granite Falls, Yellow Medicine County, Minnesota.	H. N. Stokes.	W. S. Bayley, B. U. S. G. S., 150, p. 286, 1898.	Gabbro.	

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. BANDASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
7	56.74	18.80	0.15	6.91	5.57	7.34	2.32	0.77	1.09				0.20	0.07		99.96	2.876
A3. III	.946	.184	.001	.096	.139	.131	.037	.008					.001	.001			27°
8	61.58	15.89	2.19	5.50	2.69	6.49	3.04	0.51	1.26	0.16	none	0.63	0 12	0.20	0.06	100.38	
A1. I	1.026	.156	.014	.076	.067	.116	.049	.006				.008	.001	.003	—		
9	56.51	18.10	4.26	2.68	4.52	8.15	3.23	1.15	0.69	—		0.48	0.14	0.11	0.04	100.10	
A1. I	.942	.177	.027	.038	.113	.145	.051	.013				.006	.001	.002	—		
10	57.04	19.11	4.37	2.48	3.94	7.34	3.48	1.16	1.09	—		0.47	0.08	0.12	trace?	100.70	
A1. I	.951	.187	.027	.035	.099	.131	.056	.013				.006	.001	.002	—		
11	53.19	17.12	4.35	5.16	3.98	9.39	2.79	0.28	1.21	0.17		1.34	0.13	trace	trace	100.05	
A1. I	.887	.168	.027	.072	.100	.168	.045	.003				.016	.001	—	—		
12	60.96	18.06	1.42	2.48	5.09	6.67	2.39	0.28	1.26	—	0.04	1.10	0.25	0.34		100.34	2.856
A2. II	1.016	.177	.009	.035	.127	.120	.039	.003				.014	.002	.005			
13	60.35	18.71	2.10	2.15	4.08	7.18	1.54	0.32	1.50	—	0.08	0.70	0.29	0.66		99.67	
A2. II	1.006	.183	.013	.030	.102	.128	.025	.003				.009	.002	.009			
14	52.02	17.14	7.96	3.52	3.13	11.57	2.38	0.60	0.28				trace	trace		99.45	2.76
A3. III	.867	.168	.050	.049	.078	.207	.039	.006					—	—			16°
15	59.25	16.75	4.00	4.82	3.81	6.88	2.56	1.92	n. d.		trace					99.99	
A3. III	.988	.164	.025	.067	.095	.123	.041	.020									
16	58.30	16.14	4.76	4.50	2.68	10.96	1.74	0.94	n. d.							100.02	2.842
A3. III	.972	.158	.030	.062	.067	.196	.028	.010									
17	60.50	20.40	1.49	2.93	2.91	6.20	3.48	1.32	0.50							99.77	
A3. III	1.008	.200	.009	.040	.073	.110	.050	.013									
18	62.21	15.60	5.26	1.36	2.61	6.55	2.50	1.63	2.25							99.97	
A3. III	1.035	.153	.033	.019	.065	.117	.040	.017									
19	56.31	20.83	4.13	1.87	4.91	7.54	1.85	1.07	1.23							99.74	
A3. III	.939	.204	.025	.026	.123	.134	.030	.012									
20	54.39	17.85	6.53	4.71	3.98	6.37	2.99	1.05	2.59							100.46	
A3. III	.907	.175	.041	.065	.100	.114	.048	.011									
21	53.14	17.82	8.69	1.98	4.58	7.26	1.51	1.18	3.26							99.42	
A3. III	.886	.174	.054	.028	.115	.129	.024	.018								(99.52)	
22	62.42	17.15	1.02	5.91	2.14	6.39	2.09	1.21	0.53				1.45	0.29		100.60	
A3. III	1.040	.168	.006	.082	.054	.114	.034	.013					.010	.004			
23	56.38	17.48	5.30	2.72	3.10	10.89	1.77	1.38	0.52			0.33				99.87	2.468
A3. III	.935	.171	.033	.038	.077	.194	.029	.015				.004					
24	55.83	18.96	5.64	3.23	2.76	7.40	3.12	1.17	1.20			0.32				99.63	2.647
A3. III	.931	.186	.035	.045	.068	.132	.050	.013				.004					

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 3. PRESODIC. BANDOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 10.8 or 4.4 ab 19.4 an 36.4 C 0.8	hy 26.5 mt 0.2	Mount Morrison, Denver Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S., 148, p. 159, 1897.	Enstatite-diabase-porphyry.	
FeS_2 NiO SrO Li_2O	0.06 trace? trace? trace	Q 21.5 or 3.3 ab 25.7 an 28.1	di 3.5 hy 12.2 mt 3.2 il 1.2	Karluk, Kadiak Island, Alaska.	W. F. Hillebrand.	G. F. Becker, 18 A. R. U. S. G. S., III, p. 42, 1898.	Diorite.	
Cr_2O_3 SrO Li_2O	trace? 0.04 trace	Q 10.9 or 7.2 ab 26.7 an 31.4	di 7.1 hy 8.6 mt 6.3 il 0.9	Lassen Peak, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 79, p. 29, 1891.	Quartz-basalt.	Dried at 105°.
SrO Li_2O	0.02 trace	Q 11.2 or 7.2 ab 29.3 an 32.8	di 2.9 hy 8.8 mt 6.3 il 0.9	Suppan's Mountain, Tehama County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 196, 1897.	Hypersthene-andesite.	Dried at 110°. Secretion in No. 49, tonalose.
FeS_2 Cr_2O_3	0.94 none	Q 10.4 or 1.7 ab 23.6 an 33.4	di 10.6 hy 9.5 mt 6.3 il 2.5 pr 0.9	Grass Valley, Nevada County, California.	H. N. Stokes.	W. Lindgren, 17 A. R. U. S. G. S., II, p. 71, 1896.	Diabase.	
S	trace	Q 23.1 or 1.7 ab 20.4 an 33.4 C 1.5	hy 14.3 mt 2.1 il 2.2	Smith's Post Island, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Esseq. Riv., 1900, p. 43.	Diorite.	Dried at 110°. "Altered."
S	trace	Q 28.3 or 1.7 ab 13.1 an 35.6 C 2.8	hy 11.3 mt 3.0 il 1.4	Smith's Post Island, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Esseq. Riv, 1900, p. 43.	Diorite.	Dried at 110°.
SO_3 Cl	trace trace	Q 11.8 or 3.3 ab 20.4 an 34.2	di 16.9 wo 0.8 mt 11.5	Portañuela, Yate Volcano, Patagonia.	H. Ziegenspeck.	H. Ziegenspeck, In. Diss., Jena, 1883, p. 29.	Basalt ?	Sum low.
		Q 15.5 or 11.1 ab 21.5 an 28.6	di 4.5 hy 12.8 mt 5.8	Great Ayton, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 224, 1884.	Andesite.	Near tonalose, cf. No. 83. Calc. to 100%?
		Q 19.9 or 5.6 ab 14.6 an 33.4	di 17.3 hy 2.5 mt 7.0	Castle Rock, Tynemouth, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 235, 1884.	Andesite.	Calc. to 100%?
		Q 18.4 or 7.2 ab 26.2 an 30.6 C 2.8	hy 11.3 mt 2.1	Vallée de Barboullière, Pyrenees Mountains, France.	A. Pisani.	A Lacroix, B. S. C. G. Fr., XI, No. 71, p. 31, 1900.	Hornblende-granite.	
		Q 24.9 or 9.5 ab 21.0 an 26.7	di 4.5 hy 4.4 mt 4.4 hm 2.2	San Pedro, Cabo de Gata, Almeria, Spain.	Kottenhain.	A. Osann, Z. D. G. G., XLIII, p. 702, 1891.	Hypersthene-dacite.	Near tonalose.
		Q 17.7 or 6.7 ab 15.7 an 87.3 C 2.9	hy 12.4 mt 5.8	Arnsdorf, Riesengebirge, Silesia.	Herz.	L. Milch, N. J. B. B., XII, p. 213, 1899.	Lamprophyr	
		Q 12.1 or 6.1 ab 25.2 an 31.7 C 0.2	hy 13.1 mt 9.5	Lupsa Valley, Persanyer Mountains, Hungary.	Herbich.	J. Budai, F. K., XVI, p. 267, 1886.	Diabase.	
		Q 17.5 or 7.2 ab 12.6 an 35.9 C 0.8	hy 11.5 mt 6.5 hm 4.2	Szekelykö, Siebenburgen, Hungary.	J. v. Szadeczky.	J. v. Szadeczky, F. K., XXII, p. 324, 1892.	Labradorite-porphyry.	
		Q 24.0 or 7.2 ab 17.8 an 31.7 C 0.7	hy 15.4 mt 1.4	Lava of 1888. Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 110, 1892.	Andesite.	
		Q 16.1 or 8.3 ab 15.2 an 35.3	di 14.7 hy 1.5 mt 7.7	Kaimeni, Methana, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende-andesite.	Segregation in No. 114, tonalose.
Cl	trace	Q 13.5 or 7.2 ab 26.2 an 34.2	di 2.3 hy 6.3 mt 8.1 il 0.6	Kosona, Methana, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende-andesite.	Segregation in No. 55, yellowstonose.

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. BANDASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
25	55.87	22.40	2.52	1.80	2.99	9.20	1.80	0.39	2.66			0.16				99.79	2.268
A3. III	.982	.219	.016	.025	.074	.164	.029	.004				.002					
26	59.66	15.51	3.76	5.40	3.67	6.56	2.50	1.08	n. d.				0.18	1.40		100.31	
A3. III	.994	.152	.024	.075	.092	.117	.040	.011					.001	.020			
27	59.47	17.12	2.33	5.69	4.04	7.24	2.23	0.30	1.35							99.77	
A3. III	.991	.168	.014	.079	.101	.128	.035	.003									
28	57.47	19.20	3.83	3.22	0.49	9.35	2.47	1.36	0.39	0.12	trace			0.97		99.10	2.738
B3. IV	.958	.188	.024	.044	.012	.167	.040	.015						.014			21°

CLASS II. DOSALANE.

RANG 1. PERALKALIC. UMPTEKASE.

1	58.04	17.24	2.49	1.24	1.79	3.50	3.37	10.06	1.95			0.30	0.22	trace		100.58 .09	
A2. II	.967	.169	.015	.017	.045	.062	.055	.107				.004	.002	—		100.49	
2	61.28	14.71	1.21	2.85	1.69	5.61	2.99	7.70	0.43	0.28		0.41	0.16	trace	0.72	100.16	
A1. I	1.021	.144	.007	.040	.042	.100	.048	.082				.006	.001	—	.005		
3	55.49	14.57	8.68	0.66	3.61	0.68	1.86	7.87	3.96			1.78	0.27			99.43	2.839
B2. III	.925	.143	.054	.009	.090	.012	.030	.084				.022	.002				

RANG 1. PERALKALIC. UMPTEKASE.

1	62.99	14.25	2.78	5.15	1.30	2.72	4.86	6.35	0.18			0.16		0.18		100.92	2.732
B2. III.	1.050	.140	.017	.072	.033	.049	0.78	.068				.002		.003			
2	57.49	16.54	4.85	0.63	4.73	1.07	3.79	7.23	3.08			0.94	0.43			100.89	2.618
B2. III.	.958	.162	.030	.009	.118	.019	.061	.077				.012	.003				
3	56.99	15.65	3.56	1.99	4.43	3.75	4.41	6.50	2.22			0.83	0.41			100.84	2.681
B2. III.	.950	.153	.022	.028	.111	.067	.071	.069				.010	.003				
4	57.33	14.06	2.07	3.59	3.55	5.68	3.34	6.32	3.08			1.05		0.09		100.16	
A2. II.	.956	.138	.013	.050	.089	.102	.054	.067				.013		.001			
5	64.46	14.96	0.95	3.73	1.36	3.30	4.39	5.44	1.07			trace	none	trace		99.66	
A3. III.	1.074	.147	.006	0.52	0.34	.059	.071	.058				—	—	—			
6	55.26	16.36	5.26	2.90	1.14	3.90	4.08	8.82	1.20			0.36				99.28	
B3. IV.	.921	.160	.033	.040	.029	.054	.066	.093				.005					
7	57.91	15.79	6.81	0.01	1.66	2.99	6.01	7.27	0.34			0.65	0.01	0.23		100.29	2.516
A2. II.	.965	.154	.042	—	.042	.053	.097	.078				.008	—	.003			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 3. PRESODIC. BANDOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 19.4 hy 8.7 or 2.2 mt 3.7 ab 15.2 an 45.6 C 2.2	Kakoperato, Aegina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende-andesite.	Segregation in No. 19, dacose. Nearly in persalane.
S 0.59	Q 19.6 di 3.7 or 6.1 hy 14.2 ab 21.0 mt 5.6 an 28.1	Obandai. Bandai San, Japan.	Shimidzu.	T. Wada, Mt. D. Ges. Ostas., V, p. 74, 1889.	Augite-andesite.	MnO high? Alk. corr., cf. N. J., 1890, II, p. 102.
	Q 20.5 hy 18.7 or 1.7 mt 3.2 ab 18.3 an 35.6 C 0.2	Bandai San, Japan.	Nishiyama.	Nishiyama, cf. N. J., 1890, II, p. 102.	Andesite.	
SO_3 0.23	Q 17.5 di 7.8 or 8.3 mt 5.6 ab 21.0 an 37.0	Volcano, New Britain, Pacific Ocean.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XVI, p. 50, 1883.	Lava.	Sum low.

ORDER 5. PERFELIC. GERMANARE.

SUBRANG 2. DOPOTASSIC. HIGHWOODOSE.

SO_3 trace Cl 0.38	or 59.5 di 9.7 ab 14.7 mt 2.6 an 3.3 il 0.6 ne 2.0 hm 0.6 so 4.9 ap 0.4	Highwood Gap, Highwood Mountains, Montana.	E. B. Hurlbut.	L. V. Pirsson, B. U. S. G. S., 148, p. 152, 1897.	Trachyte.	
SO_3 0.08 SrO 0.04	Q 3.4 di 16.0 or 45.6 wo 1.9 ab 25.2 mt 1.6 an 3.9 il 0.8	Turnback Creek, Tuolumne County, California.	H. N. Stokes.	H. W. Turner, B. U. S. G. S., 148, p. 217, 1897.	Augite-syenite.	
	Q 7.6 hy 9.0 or 46.7 il 1.5 ab 15.7 hm 8.7 an 3.3 ru 1.0 C 1.7	Winterbach, n. St. Wendel, Harz Mountains.	Fischer.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 266, 1892.	Augite-syenite-porphyry.	Iron oxides and TiO_2?

SUBRANG 3. SODIPOTASSIC. ILMENOSE.

	Q 2.6 ac 2.8 or 37.8 di 11.5 ab 37.7 hy 5.5 mt 2.6	Beverley, Essex County, Massachusetts.	F. E. Wright.	F. E. Wright, T. M. P. M., XIX, p. 318, 1900.	Umptekite.	
SO_3 0.11	or 42.8 hy 6.6 ab 32.0 ol 3.7 an 5.3 il 1.6 C 0.5 hm 4.9	Gotteskopf, n. Ilmenau, Thuringia.	Fischer.	H. Loretz, Jb. Pr. G. L-A., XIII, p. 135, 1893.	Porphyrite.	Iron oxides?
SO_3 0.10	or 38.4 di 9.6 ab 32.5 ol 4.7 an 3.6 mt 4.2 ne 2.6 il 1.5 hm 0.6 ap 1.0	Gotteskopf, n. Ilmenau, Thuringia.	Fischer.	H. Loretz, Jb. Pr. G. L-A., XIII, p. 135, 1893.	Porphyrite.	
	or 37.3 di 19.1 ab 28.3 hy 3.0 an 4.7 mt 3.0 il 2.0	Gailbach, Spessart, Bavaria.	E. Goller.	E. Goller, N. J. B. B., VI, p. 566, 1889.	Kersantite.	Near monzonose.
	Q 8.6 di 9.5 or 32.2 hy 4.7 ab 37.2 mt 1.4 an 5.0	Hengstberg, n. Grimma, Saxony.	P. Jannasch.	H. Rosenbusch, Elemente, p. 269, 1898.	Pyroxene-quartz-porphyry.	
	or 51.7 di 8.0 ab 19.9 wo 2.0 an 0.3 mt 7.7 ne 0.8	Madonna di Lauro, Vetralla, Viterbo, Italy.	A. Röhrig.	H. S. Washington, J. G., IV, p. 849, 1896.	Leucite-trachyte.	Sum low.
Cl 0.61	Q 0.7 ac 6.0 or 43.4 di 9.1 ab 26.2 wo 1.3 so 8.2 hm 3.4	Mte. Santo, Naples, Italy.	H. J. Johnston-Lavis.	H. J. Johnston-Lavis, Geol. Mag. Dec. III, VI, p. 77, 1889.	Trachyte.	Also in B. C. G., Ital., XX, p. 136, 1889. Iron oxides?

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. UMPTEKASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	59.01	18.18	1.63	3.65	1.05	2.40	7.03	5.34	0.50	0.15		0.81	trace	0.03	0.08	99.98	
A1. I.	.984	.178	.010	0.51	.026	.043	.113	.057				.010	—	—	.001		
2	64.28	15.97	2.91	3.18	0.03	0.85	7.28	5.07	0.20			0.50	0.08	trace	none	100.33	2.703
A2. II.	1.071	.156	.018	.044	.001	.015	.117	.054				.006	.001	—	—		22°
3	59.66	16.97	3.18	1.15	0.80	2.32	8.38	4.17	2.53	0.07		trace	0.14	0.19		99.56	
A2. II.	.994	.166	.034	.016	.020	.042	.135	.044				—	.001	.003			
4	63.69	15.03	2.51	2.41	0.80	3.30	6.54	2.46	2.23				trace	0.55		99.52	2.55
A3. III.	1.062	.147	.015	.033	.020	.059	.105	.026					—	.008			15°
5	58.81	18.54	5.00	1.80	1.02	3.81	7.90	3.06	n. d.							99.94	
A3. III	.980	.182	.031	.025	.026	.068	.127	.033									
6	62.70	16.40	3.34	2.35	0.79	0.95	7.13	5.25	0.70			0.92		trace		100.53	
A2. II	1.045	.161	.021	.033	.020	.017	.115	.056				.011		—			
7	60.50	16.86	1.67	2.54	1.11	2.95	6.46	5.42	1.40		0.70	0.75	0.21	0.20		100.77	
A2. II	1.008	.165	.010	.035	.028	.053	.104	.058				.009	.002	.003			
8	58.90	17.70	3.94	2.37	0.54	1.05	7.39	5.59	1.90			0.40	trace	0.55		100.33	
A2. II	.982	.173	.025	.033	.014	.019	.119	.060				.005	—	.008			
9	57.52	18.46	2.23	2.44	1.08	2.12	7.58	4.08	1.80			0.92	0.21			99.64	
A2. II	.959	.181	.014	.034	.027	.038	.122	.043				.011	.002				
10	57.00	18.03	1.33	3.52	1.53	3.55	7.53	3.89	1.30		1.05	0.55	0.41	0.49		100.18	
A2. II	.950	.177	.008	.049	.038	.063	.121	.041				.007	.003	.007			
11	63.71	16.59	2.92	0.66	0.90	3.11	8.26	2.79	0.19			0.86		0.20		100.19	
A2. II	1.062	.163	.018	.009	.023	.056	.135	.030				.011		.003			
12	57.78	15.45	3.06	3.11	1.13	1.72	11.03	2.89	0.94			1.83		0.98		99.92	
A2. II	.963	.151	.019	.043	.028	.031	.178	.031				.022		.013			
13	60.89	17.16	3.60	3.18	0.49	3.07	6.88	4.23	0.37							99.87	
A3. III	1.015	.168	.022	.044	.012	.055	.111	.045									
14	61.01	16.62	3.55	2.81	0.06	3.27	5.92	5.22	1.13				trace	0.55		100.14	
A3. III	1.017	.163	.022	.039	.002	.058	.095	.056					—	.008			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. UMPTEKOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 trace Cl 0.12 SrO trace Li_2O trace	or 31.7 di 8.2 ab 41.9 ol 1.9 an 2.2 mt 2.3 ne 9.9 il 1.5	Red Hill, New Hampshire.	W. F. Hillebrand.	W. S. Bayley, B. G. S. A., III, p. 250, 1892.	Nephelite-syenite.	Near laurdalose.
	Q 2.0 ac 6.9 or 30.0 di 3.7 ab 53.4 hy 2.8 mt 0.7 il 0.9	Andrews Point, Cape Ann, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, A. J. S., VI, p. 178, 1898.	Glaucophane-sölvsbergite.	Dried at 110°.
	or 24.5 ac 6.0 ab 48.7 di 4.3 ne 8.2 wo 2.5 mt 3.7 hm 0.8	Peaked Butte, Crazy Mountains, Montana.	W. H. Melville.	Wolff and Tarr, B. M. C. Z., XVI, p. 232, 1893.	Nephelite-syenite.	
SO_3 trace Cl trace Cu trace	Q 9.8 di 9.4 or 14.5 mt 3.5 ab 55.0 an 4.4	Yate Volcano, Patagonia.	H. Ziegenspeck.	H. Ziegenspeck, In. Diss., Jena, p. 42, 1883.	Augite-andesite.	Near pantellerose and kallerudose.
	or 18.3 di 5.6 ab 54.0 wo 2.3 an 6.1 mt 5.8 ne 6.8 hm 1.0	Ostvaagö, Lofoten Islands, Norway.	T. Matthiesen.	C. F. Kolderup, Berg. Mus. Aarb., 1898, No. 7, p. 23.	Labradorite-rock.	Near akerose.
	or 31.1 ac 4.6 ab 55.0 di 3.9 ol 1.1 mt 2.6 il 1.7	Laugendal, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg. I, p. 80, 1894.	Hornblende-sölvsbergite.	
	or 32.2 di 10.1 ab 46.1 wo 0.6 an 0.8 mt 2.3 ne 4.5 il 1.4	Ostö, Christiania Fjord, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 190, 1899.	Hedrumite.	
	or 33.4 ac 2.8 ab 43.0 di 4.7 ne 8.8 ol 1.0 mt 4.4 il 0.8	Kjose Aklungen, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 102, 1894.	Aegirite-mica-sölvsbergite.	
	or 23.9 di 5.1 ab 50.3 ol 2.1 an 4.4 mt 3.2 ne 7.4 il 1.7	Skirstad Lake, Gran, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 181, 1894.	Foyaite.	"Hedrumite" in Eg. Kg. III, p. 190, 1899.
	or 22.8 di 8.4 ab 45.1 ol 3.0 an 4.2 mt 1.9 ne 9.9 il 1.1 ap 1.1	Brathagen, Laugendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg. III, p. 116, 1899.	Heumite.	Near laurdalose. Border of dike cf. No. 12, essexose.
	or 16.7 ac 0.9 ab 69.2 di 5.0 ne 0.3 wo 3.9 il 1.7 hm 2.6	Umpjärvi, Kola, Finland.	W. Petersson.	W. Ramsay, Fennia, XI, p. 205, 1894.	Umptekite.	
	or 17.2 ac 8.8 ab 52.4 ns 4.7 ne 5.7 ol 4.0 il 3.4	Tuoljlucht, Umptek, Kola, Finland.	H. Bergholl,	V. Hackman, Fennia, XI, No. 2, p. 139, 1894.	Nephelite-syenite (Lujavrite).	
	or 25.0 di 8.1 ab 55.5 wo 1.0 am 3.3 mt 5.1 ne 1.4	Steinburg, Westerwald, Prussia.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn., LIII, p. 51, 1896.	Trachyte.	
Cl trace	Q 1.3 di 4.7 or 31.1 wo 3.1 ab 49.8 mt 5.1 an 3.3	Cape Adare, Antarctic Continent.	J. A. Schofield.	David, Smeeth, and Schofield, V. R. Soc. N. S. W., XXIX., p. 473, 1895.	Trachyte.	Near ilmenose.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	51.05	14.49	4.16	4.37	8.16	5.11	1.85	7.25	1.05			1.76	0.70			99.94	
A2. II	.851	.142	.026	.061	.204	.091	.030	.077				.022	.005				
2	56.39	12.88	2.36	3.54	7.83	4.06	1.30	7.84	1.33			2.07		trace		99.60	
A3. III	.940	.126	.015	.049	.196	.072	.021	.083				.026		—			
3	55.85	19.31	3.77	1.88	1.73	3.84	3.39	8.77	1.14					trace		99.68	2.648
A3. III	.931	.189	.024	.026	.043	.068	.055	.094						—			
4	57.31	14.71	1.21	4.37	7.80	6.90	1.35	6.38	0.18			0.40		trace	none	100.61	
A2. II	.955	.144	.008	.061	.195	.123	.022	.068				.005		—	—		
5	55.46	15.36	1.34	4.50	7.90	6.69	1.79	6.63	0.23	0.15				trace		100.21	2.700
A3. III	.924	.151	.008	.062	.198	.119	.029	.071						—			
6	55.21	19.81	2.69	2.86	1.68	4.61	3.13	8.45	0.99			trace				99.43	2.609
A3. III	.920	.194	.016	.040	.042	.082	.050	.090				—					10°

RANG 2. DOMALKALIC. MONZONASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	57.97	17.28	2.23	3.75	2.20	4.33	4.31	4.12	0.57	0.18	0.05	1.54	0.64	0.15	0.07	99.75	
A1. I	.966	.169	.014	.052	.055	.077	.071	.044				.018	.004	.002	.001		
2	60.56	16.19	5.19	2.41	1.30	2.09	4.78	4.82	0.51			1.19	0.30	0.36		99.70	2.633
A2. II	1.009	.159	.032	.033	.033	.037	.077	.051				.015	.002	.005			
3	61.65	15.07	2.03	2.25	3.67	4.61	4.35	4.50	0.41	0.26		0.56	0.33	0.09	0.27	100.15	
A1. I	1.028	.148	.013	.031	.092	.083	.070	.048				.007	.002	.001	.002		
4	54.42	14.28	3.32	4.13	6.12	7.72	3.44	4.22	0.38	0.22		0.80	0.59	0.10	0.32	100.19	
A1. I	.907	.140	.021	.059	.153	.138	.055	.045				.010	.004	.001	.002		
5	52.26	13.96	2.76	4.45	8.21	7.06	2.80	3.87	1.34	1.53	0.49	0.58	0.52	0.14	0.23	100.25	
A1. I	.871	.137	.017	.062	.205	.126	.045	.041				.007	.003	.002	.002		
6	52.81	15.66	3.06	4.76	4.99	7.57	3.60	4.84	0.93	0.16		0.71	0.75	trace	0.24	100.22	
A1. I	.880	.152	.019	.066	.125	.135	.058	.051				.009	.005	—	.002		
7	55.23	18.31	4.90	2.06	1.85	3.62	4.02	6.43	1.84		none	0.42	0.58	trace	0.46	100.27 .08	
A1. I	.921	.179	.030	.030	.046	.064	.064	.068				.005	.004	—	.003	100.19	
8	51.65	13.89	2.70	4.80	11.56	4.07	2.99	4.15	1.89	1.30		0.55	0.21	0.15	0.19	100.37	
A1. I	.861	.136	.017	.067	.289	.073	.048	.044				.007	.002	.002	.001		
9	57.29	18.45	4.38	1.20	2.08	3.57	4.43	5.43	2.01	0.17		0.72	0.46	trace		100.31	
A2. II	.955	.181	.027	.017	.052	.064	.071	.058				.009	.003	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 2. DOPOTASSIC. CIMINOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 42.8 di 9.3 ab 11.5 ol 12.4 am 9.7 mt 6.0 ne 2.8 il 3.2 ap 1.7	Durbach, Schwarzwald, Baden.	Not stated.	A. Sauer, Mt. Bad. G. L-A., II, p. 258, 1892.	Durbachite.	
	Q 1.0 di 11.1 or 46.1 hy 15.6 ab 11.0 mt 3.5 an 6.0 il 4.0	Monte Catini, n. Volterra, Tuscany.	H. S. Washington.	H. S. Washington, A. J. S., IX, p. 47, 1900.	Mica-trachyte (selagite).	
	or 52.3 di 6.0 ab 14.7 ol 1.2 an 11.1 mt 5.6 ne 7.7	Bagnorea, n. Orvieto, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 370, 1897.	Leucite-phonolite.	
	or 37.8 di 15.3 ab 11.5 hy 16.2 an 15.0 ol 1.8 mt 2.2	La Colonetta, Mte. Cimino, n. Viterbo, Italy.	H. S. Washington.	H. S. Washington, A. J. S., IX, p. 44, 1900.	Ciminite.	
	or 39.5 di 15.3 ab 13.6 ol 14.2 an 14.2 mt 1.9 ne 0.9	Fontana Fiescoli, Mte. Cimino, n. Viterbo, Italy.	H. S. Washington.	H. S. Washington, A. J. S., IX, p. 44, 1900.	Ciminite.	
	or 50.0 di 6.3 ab 12.6 ol 8.1 an 15.0 mt 8.7 ne 7.4	Mte. Venere, Mte. Vico, n. Viterbo, Italy.	H. S. Washington.	H. S. Washington, V. G., IV, p. 849, 1896.	Leucite-trachyte.	

SUBRANG 3. SODIPOTASSIC. MONZONOSE.

F 0.04 FeS$_2$ 0.32 NiO trace	Q 4.9 di 2.5 or 24.5 hy 6.9 ab 37.2 mt 3.2 an 15.0 il 2.9 ap 1.3	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 69, 1897.	Diorite.	
	Q 8.4 di 1.3 or 28.4 hy 2.7 ab 40.3 mt 4.4 an 8.6 il 2.8 hm 2.0	Elliott County, Kentucky.	T. M. Chatard.	J. S. Diller, A. J. S., XXXII, p. 125, 1886.	Syenite.	Also in B. U. S. G. S., 38, p. 24, 1887.
SrO 0.10 Li$_2$O trace	Q 6.2 di 11.9 or 26.7 hy 5.0 ab 36.7 mt 3.0 an 8.3 il 1.1	Yogo Peak, Little Belt Mountains, Montana.	W. F. Hillebrand.	Weed and Pirsson, A. J. S., L, p. 471, 1895.	Syenite.	Also in 20 A. R. U.S.G.S., III, p. 473, 1900.
SrO 0.13 Li$_2$O trace	or 25.0 di 19.1 ab 28.8 hy 9.9 an 11.1 mt 2.6 il 1.5 ap 1.3	Yogo Peak, Little Belt Mountains, Montana.	W. F. Hillebrand.	Weed and Pirsson, A. J. S., L, p. 473, 1895.	Monzonite (yogoite).	Also in 20 A. R. U.S.G.S., III, p. 478, 1900.
Cr$_2$O$_3$ trace SrO 0.05 Li$_2$O trace	or 22.8 di 14.8 ab 23.6 hy 7.0 an 14.2 ol 8.0 mt 3.9 il 1.1 ap 1.1	Sheep Creek, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 531, 1900.	Augite-minette.	
SO$_3$ trace Cl 0.07 F trace SrO 0.09 Li$_2$O trace	or 28.4 di 16.6 ab 23.1 ol 7.0 an 12.0 mt 4.4 ne 4.0 il 1.2 ap 1.8	Beaver Creek, Bearpaw Mountains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., I, p. 357, 1896.	Monzonite.	
SO$_3$ 0.23 Cl 0.32 SrO trace	Q 5.3 hy 4.6 or 37.8 mt 5.8 ab 21.0 il 0.8 an 15.0 hm 0.8 so 3.9 ap 1.3 no 1.8	Aspen Creek, Highwood Mountains, Montana.	H. W. Foote.	L. V. Pirsson, B. U. S. G. S., 148, p. 152, 1897.	Trachyte.	
SO$_3$ 0.19 Cr$_2$O$_3$ 0.08	or 24.5 di 6.5 ab 25.2 hy 2.4 an 12 2 ol 20.6 mt 3.9 il 1.1	Cottonwood Creek, Montana.	T. M. Chatard.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 670, 1895.	Lamprophyre.	
NiO 0.12	Q 1.4 di 0.4 or 32.2 hy 5.0 ab 37.2 mt 1.9 an 14.5 il 1.2 hm 3.0 ap 1.1	Stinkingwater River, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, J. G., III, p. 947, 1895.	Quartz-banakite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
10	52.63	16.87	4.52	3.11	3.69	4.77	3.86	5.17	3.65			0.81	0.63	0.10	0.29	100.10	
A1. I	.877	.164	.028	.043	.092	.086	.062	.056				.010	.004	.001	.002		
11	52.33	18.70	4.95	1.83	2.69	4.71	4.51	5.45	2.71	0.74		0.71	0.81	0.03		100.31	
A1. I	.872	.183	.031	.025	.067	.084	.072	.059				.009	.005	—			
12	52.10	16.34	3.84	6.82	4.33	4.73	4.02	4.20	1.74			0.79	0.68	trace		100.18 .05 100.13	
A1. I	.868	.160	.024	.095	.108	.084	.065	.045				.010	.005	—			
13	51.82	16.75	4.56	3.36	4.03	4.94	3.91	5.02	3.97			0.71	0.52	0.23	0.26	100.08	
A1. I	.864	.164	.029	.047	.101	.088	.063	.054				.009	.003	.003	.002		
14	51.46	18.32	4.61	2.71	2.91	6.03	4.11	4.48	3.89			0.83	0.86	0.17		100.38	
A2. II	.858	.180	.029	.008	.073	.108	.066	.048				.010	.006	.002			
15	59.78	16.86	3.08	3.72	0.69	2.96	5.39	5.01	1.58		0.75			0.14		99.96	2.689
A3. III	.996	.166	.020	.051	.017	.053	.087	.054						.002			30°
16	59.79	17.25	3.60	1.59	1.24	3.77	5.04	5.05	0.39	0.19	0.72	0.67	0.35	0.20	0.14	100.14	2.704
A1. I	.997	.169	.023	.022	.031	.068	.081	.055				.008	.002	.003	.001		25°
17	57.48	18.04	5.73	0.73	1.17	5.03	4.28	4.15	0.55	0.62		1.00	0.66	trace	0.20	99.98	
A1. I	.958	.176	.035	.010	.029	.089	.069	.044				.012	.005	—	.001		
18	57.48	14.09	5.21	1.35	3.49	6.05	3.00	4.69	1.37	1.20		0.94	0.65	0.09	0.23	99.92	
A1. I	.958	.138	.033	.019	.087	.108	.048	.050				.012	.005	.001	.002		
19	57.04	13.66	4.96	1.77	4.43	6.23	3.08	4.95	1.10	1.11		0.94	0.63	0.17	0.22	100.36	
A1. I	.951	.134	.031	.025	.111	.111	.050	.053				.012	.004	.002	.002		
20	55.35	12.91	4.67	2.06	6.29	5.77	2.65	4.86	1.18	2.67		0.87	0.58	0.08	0.19	99.98	
A1. I	.923	.126	.029	.029	.157	.103	.043	.052				.011	.004	.001	.001		
21	59.43	16.68	2.54	3.48	1.84	4.09	3.72	5.04	0.72	0.27		1.38	0.58	trace	0.14	100.04	2.61
A1. I	.991	.163	.015	.049	.046	.073	.059	.054				.017	.004	—	.001		
22	58.18	18.46	2.31	3.79	1.99	3.11	3.70	6.58	0.64			0.68	0.41		0.29	100.14	2.777
A2. II	.970	.181	.014	.053	.050	.055	.060	.070				.008	.003		.002		
23	52.00	18.06	2.18	5.14	2.84	4.59	3.78	4.68	1.84		3.59	0.98		0.25		99.93	
A2. II	.867	.176	.014	.071	.071	.082	.061	.050				.012		.004			
24	58.00	16.91	3.29	3.74	1.96	3.60	5.14	5.20	0.60			0.85		0.80		100.09	
A2. II	.967	.166	.021	.052	.049	.064	.083	.055				.011		.011			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODIPOTASSIC. MONZONOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 31.1 di 6.0 ab 30.9 ol 4.9 an 12.8 mt 6.5 ne 0.9 il 1.5 ap 1.4	Hoodoo Mountain, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 947, 1895.	Banakite.	
NiO 0.14	or 32.8 di 3.4 ab 27.8 ol 3.6 an 13.5 mt 3.7 ne 5.4 il 1.4 hm 2.4 ap 1.7	Stinkingwater River, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, J. G., III, p. 947, 1895.	Banakite.	
SO_3 0.22 Cl 0.24 Li_2O 0.13	Q 1.1 di 1.5 or 25.0 hy 18.0 ab 22.0 mt 5.6 an 16.7 il 1.5 so 3.3 ap 1.6 no 2.1	Indian Creek Laccolith, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 83, 1899.	Augite-andesite-porphyry.	Same sheet as No. 8, kentallenose.
	or 30.0 di 7.0 ab 28.3 ol 5.6 an 13.1 mt 6.7 ne 2.6 il 1.4 ap 1.1	Lamar River, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 947, 1895.	Banakite.	
	or 26.7 di 4.8 ab 30.9 ol 3.6 an 18.3 mt 6.7 ne 2.0 il 1.5 ap 2.0	Ishawooa Canyon, Wyoming.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 947, 1895.	Banakite.	
	Q 1.4 di 6.7 or 30.0 hy 2.4 ab 45.6 mt 4.6 an 7.0	Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, Pr. Col. Sc. Soc., II, p. 240, 1887.	Syenite.	Also in 17 A. R. U. S. G. S., II, p. 281, 1896.
SO_3 0.04 Cl trace SrO 0.11 Li_2O trace	Q 3.1 di 6.7 or 30.6 mt 3.2 ab 42.4 il 1.2 an 9.5 hm 1.4 ap 0.8	Near Tirbircio Gulch, La Plata Mountains, Colorado.	H. N. Stokes.	W. Cross, B. U. S. G. S., 168, p. 162, 1900.	Syenite.	
ZrO_2 0.04 SO_3 0.16 V_2O_3 0.02 SrO 0.12	Q 6.8 di 2.3 or 24.5 hy 1.8 ab 36.2 il 1.5 an 17.5 hm 5.7 ap 1.6	Wicher Mountain, Pike's Peak, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 148, p. 163, 1897.	Pyroxene-andesite?	Complete in B. U. S. G. S., 168, p. 145, 1900.
NiO 0.08 SrO trace Li_2O none	Q 9.0 di 11.5 or 27.8 hy 3.4 ab 25.2 mt 1.9 an 11.1 il 1.8 hm 4.0 ap 1.6	Santa Maria Basin, Arizona.	W. F. Hillebrand.	J. P. Iddings, B. Ph. Soc. Wash., XII, p. 212, 1892.	Mica-basalt.	Near adamellose. Also in B. U. S. G. S., 148, p. 187, 1897.
NiO 0.07 SrO trace Li_2O trace?	Q 6.6 di 9.9 or 29.5 hy 6.5 ab 26.2 mt 3.2 an 9.2 il 1.8 hm 2.7 ap 1.4	Santa Maria Basin, Arizona.	W. F. Hillebrand.	J. P. Iddings, B. Ph. Soc. Wash., XII, p. 212, 1892.	Mica-basalt.	Near adamellose. Also in B. U. S. G. S., 148, p. 187, 1897.
NiO 0.05 SrO trace Li_2O trace	Q 4.4 di 13.0 or 28.9 hy 9.7 ab 22.5 mt 4.4 an 8.6 il 1.7 hm 1.6 ap 1.4	Santa Maria Basin, Arizona.	W. F. Hillebrand.	J. P. Iddings, B. Ph. Soc. Wash., XII, p. 212, 1892.	Mica-basalt.	Near adamellose. Also in B. U. S. G. S., 148, p. 187, 1897.
ZrO_2 0.08 SrO trace Li_2O none	Q 8.4 di 2.3 or 29.0 hy 5.8 ab 30.9 mt 3.5 an 13.9 il 2.6 ap 1.4	Dardanelle Flow, Tuolumne County, California.	H. N. Stokes.	F. L. Ransome, B. U. S. G. S., 89, p. 58, 1898.	Augite-latite.	Also in A. J. S. V., p. 363, 1898.
	Q 0.4 hy 9.1 or 38.9 mt 3.2 ab 31.4 il 1.2 an 14.2 ap 1.0	Tito, Coquimbo, Chile.	A. Lindner.	F. v. Wolff, Z. D. G. G., LI, p. 531, 1899.	Odinite.	
	or 27.8 di 3.9 ab 30.4 ol 8.1 an 18.1 mt 3.2 ne 0.9 il 1.8	Onston Ness, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edinb., XXXIX, pt. 4, p. 873, 1900.	Bostonite.	Not fresh.
	or 30.6 di 8.2 ab 43.0 ol 2.7 an 7.8 mt 4.9 ne 0.3 il 1.7	Tuft, Laugendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., II, p. 33, 1895.	Akerite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
25	56.23	17.22	2.81	1.01	4.85	1.79	4.33	4.81	4.87		0.55	1.36	0.21			100.26	2.56
A2. II	.937	.169	.017	.014	.121	.032	.069	.051				.016	.002				
26	58.41	17.01	3.44	2.61	2.95	4.29	4.39	4.23	1.59		0.29	0.98	0.40			100.70	2.729
A2. II	.974	.167	.022	.036	.074	.077	.071	.045				.012	.003				
27	58.40	16.81	3.47	2.69	3.90	1.54	4.48	5.03	2.66		0.48	0.25	0.43			100.14	2.642
A2. II	.973	.165	.022	.038	.098	.028	.072	.054				.003	.003				
28	58.40	15.61	2.72	2.94	3.50	3.97	3.13	5.37	1.72		2.56	0.38	0.40			100.70	2.674
A2. II	.973	.153	.017	.041	.088	.071	.050	.058				.005	.003				
29	56.29	15.52	5.28	0.84	5.31	2.47	3.46	5.26	3.86		0.95	trace	0.37			99.77	2.660
A2. II	.938	.152	.033	.011	.133	.045	.056	.057				—	.003				
30	54.81	17.80	2.69	4.46	5.03	1.78	4.06	3.86	3.56		0.44	0.75	0.45			99.69	2.712
A2. II	.914	.174	.017	.062	.126	.032	.065	.041				.009	.003				
31	54.64	17.13	6.79	1.17	3.00	3.28	4.43	6.29	2.00			1.47	0.42			100.75	2.720
A2. II	.911	.168	.042	.017	.075	.059	.071	.067				.018	.003				
32	53.92	16.60	6.87	0.99	4.26	3.54	3.22	7.45	2.15			1.08	0.62			100.83	2.709
A2. II	.899	.163	.043	.014	.107	.063	.051	.080				.013	.004				
33	52.12	13.52	2.56	4.53	6.36	5.78	2.34	5.36	1.86		3.59	1.20	0.92			100.36	2.726
A2. II	.869	.132	.016	.062	.159	.103	.038	.058				.015	.006				
34	59.86	16.68	2.79	3.00	3.51	3.96	3.58	4.30	1.44			0.75				99.87	
A3. III	.998	.163	.017	.042	.088	.071	.058	.046				.009					
35	58.69	13.91	2.41	3.94	6.63	3.41	2.62	4.53	2.69			0.83	0.30			99.96	
A2. II	.978	.136	.015	.055	.166	.060	.042	.048				.010	.002				
36	55.35	16.71	3.34	6.31	2.04	3.70	3.29	5.69	3.26				trace	trace		99.69	2.74
A3. III	.923	.164	.021	.088	.051	.066	.053	.061					—	—			
37	54.15	18.25	3.62	2.09	2.56	4.89	4.43	6.56	3.69			trace	0.41			100.65	2.632
A3. III	.903	.179	.023	.029	.064	.087	.071	.070				—	.003				
38	54.20	15.73	3.67	5.40	3.40	8.50	3.07	4.42	0.50			0.40	0.50	0.70		100.50	
A2. II	.903	.154	.023	.075	.085	.151	.050	.047				.005	.004	.010			
39	59.73	16.79	1.44	3.21	1.47	3.27	4.31	6.09	3.93					0.17		100.31	
A3. III	.996	.164	.009	.044	.037	.059	.069	.065						.002			
40	56.75	18.37	2.22	3.04	2.02	4.68	4.85	5.92	0.18	—		1.24		trace		99.38	
B2. III	.946	.180	.014	.042	.051	.083	.078	.063				.015		—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODIPOTASSIC. MONZONOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.15 Org 0.07	Q 1.9 hy 12.1 or 28.4 il 2.3 ab 36.2 hm 2.8 an 8.9 C 1.7	Namborner Mühle, Saar-Nahe Gebiet, Rh. Prussia.	K. Gremse.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 290, 1892.	Meso-keratophyr.	Not fresh.
SO_3 0.11	Q 5.0 di 3.6 or 25.0 hy 6.0 ab 37.2 mt 5.1 an 14.2 il 1.8 ap 1.0	Nahethal, Rh. Prussia.	Hampe.	H. Loretz, Jb. Pr. G. L-A., IX, p. 300, 1889.	Porphyrite.	
SO_3 trace	Q 2.8 hy 11.9 or 30.0 mt 5.1 ab 37.7 il 0.5 an 7.8 C 1.1	Kreiseberg, Thüringerwald.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L-A., IX, p. 300, 1889.	Biotite-porphyrite.	
SO_3 trace	Q 6.1 di 5.9 or 32.2 hy 8.2 ab 26.2 mt 3.9 an 12.5 il 0.8	Unter Neubrunn, Thüringerwald.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L-A., VIII, p. 108, 1888.	Mica-porphyrite.	Not fresh.
SO_3 0.16	Q 2.9 hy 13.3 or 31.7 mt 2.6 ab 29.3 hm 3.5 an 10.8 ap 0.8	Gotteskopf, n. Ilmenau, Thuringia.	K. Klüss.	H. Loretz, Jb. Pr. G. L-A., XIII, p. 135, 1893.	Porphyrite.	SO_3 for S. Not fresh.
SO_3 trace	Q 3.1 hy 17.3 or 22.8 mt 3.9 ab 34.1 il 1.4 an 8.9 C 3.7	Unter Neubrunn, Thüringerwald.	W. Hampe.	H. Loretz, Jb. Pr. G. L-A., VIII, p. 105, 1888.	Kersantite.	Not fresh.
SO_3 0.13	or 37.3 di 6.3 ab 29.9 ol 3.2 an 8.3 il 2.6 ne 4.0 hm 6.8	Langewiesen, n. Ilmenau, Thuringia.	Fischer.	H. Loretz, Jb. Pr. G. L-A., XIII, p. 135, 1893.	Porphyrite.	SO_3 for S.
SO_3 0.13	or 44.5 di 6.7 ab 19.9 ol 5.3 an 8.9 il 2.1 ne 3.7 hm 6.9 ap 1.4	Langewiesen, n. Ilmenau, Thuringia.	Hesse.	H. Loretz, Jb. Pr. G. L-A., XIII, p. 135, 1893.	Porphyrite.	SO_3 for S.
SO_3 0.22	Q 0.2 di 10.3 or 32.2 hy 14.0 ab 20.0 mt 3.7 an 10.0 il 2.3 ap 2.0	Unter Neubrunn, Thüringerwald.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L-A., VIII, p. 105, 1888.	Kersantite.	SO_3 for S. Not fresh.
	Q 8.4 di 2.6 or 25.6 hy 9.6 ab 30.4 mt 3.9 an 16.4 il 1.4	Farrenkopf, Schwarzwald, Baden.	M. Dittrich.	A. Sauer, G. Sp. Kt. Baden, Bl. Hornberg, p. 27, 1897.	Syenite.	
	Q 8.2 di 3.1 or 26.7 hy 19.0 ab 22.0 mt 3.5 an 12.8 il 1.5	Frohnau, Schwarzwald, Baden.	M. Dittrich.	A. Sauer, G. Sp. Kt. Baden, Bl. Hornberg, p. 27, 1897.	Mica-syenite.	
	Q 0.3 di 3.8 or 33.9 hy 12.1 ab 27.8 mt 4.9 an 13.9	Neudeck, Silesia.	H. Traube.	H. Traube, N. J., 1890, I, p. 225.	Mica-syenite.	
	or 38.9 di 10.9 ab 20.4 ol 1.5 an 10.6 mt 5.2 ne 9.1	Mühlorzen, n. Gauté, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XVII, p. 87, 1897.	Gauteite.	Not fresh.
	or 26.1 di 18.4 ab 26.2 hy 3.3 an 15.8 ol 2.8 mt 5.3 il 0.8 ap 1.3	Monzoni, Tyrol.	V. Schmelck.	W. C. Brögger, Eg. Kg., II, p. 24, 1895.	Monzonite.	P_2O_5 approximate.
	Q 1.9 di 6.8 or 36.1 hy 5.0 ab 36.2 mt 2.1 an 8.3	Mte. Amiata, Tuscany.	L. Ricciardi.	A. Verri, B. Soc. G. It., VIII, p. 408, 1899.	Trachyte.	
Cl 0.11	or 35.0 di 10.0 ab 30.9 ol 1.4 an 10.8 mt 3.2 ne 5.4 il 2.3	L'Arso, Ischia, Italy.	H. S. Washington.	H. S. Washington, A. J. S., VIII, p. 290, 1899.	Trachyte (ciminite).	Dried at 110°. Sum low.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	46.77	14.91	7.80	4.90	2.94	6.30	4.97	2.37	4.28	0.92	trace	2.31	0.98	0.29	0.04	99.90	
A1. I	.780	.146	.049	.068	.074	.112	.080	.025				.028	.007	.004	—		
2	59.27	15.76	2.07	3.57	3.04	3.69	5.63	3.33	0.74	0.23	0.30	1.12	0.42	0.37	trace?	100.10 .19	
A1. I	.988	.155	.013	.050	.076	.066	.091	.035				.014	.003	.005	—	99.91	
3	56.53	16.47	1.58	5.40	2.67	4.90	5.59	3.80	0.60	0.23	0.05	1.40	0.27	0.20	trace	99.98 .09	
A1. I	.942	.161	.010	.075	.067	.088	.090	.040				.017	.002	.003	—	99.89	
4	56.51	16.59	1.35	6.59	2.52	4.96	5.15	3.05	0.71	0.21	0.33	1.20	0.41	0.24	0.03	100.26 .11	
A1. I	.942	.163	.008	.092	.063	.089	.083	.032				.015	.003	.003	—	100.15	
5	56.01	15.19	2.34	4.89	4.67	4.85	5.66	2.16	0.90	0.36		1.13	0.53	0.40	trace?	99.21	
A1. I	.934	.149	.016	.068	.117	.087	.091	.023				.014	.004	.006	—		
6	55.28	17.23	1.54	6.23	2.69	5.60	5.42	2.10	0.71	0.20	0.04	1.64	0.73	0.24	0.06	100.15 .13	
A1. I	.921	.169	.010	.087	.067	.100	.087	.023				.020	.005	.003	—	100.02	
7	61.87	17.26	2.35	2.43	1.82	3.23	5.18	3.83	1.07			0.87		0.03		99.94	2.67
A2. II	1.036	.169	.015	.034	.046	.058	.083	.041				.011		—			
8	61.08	16.62	2.87	2.56	1.65	3.66	4.75	3.90	0.97	0.44		0.73	0.63	trace	0.32	100.26	
A1. I	1.018	.163	.018	.036	.041	.065	.077	.041				.009	.005	—	.002		
9	58.28	17.89	3.20	1.73	1.51	3.69	5.89	5.34	0.98	0.17		0.68	0.26	0.06	0.36	100.05	
A1. I	.971	.175	.020	.024	.038	.066	.095	.057				.008	.002	.001	.003		
10	56.75	16.40	4.78	3.10	3.22	5.34	4.19	3.36	0.82	0.40		0.86	0.52	0.17	0.33	100.34	
A1. I	.946	.161	.030	.043	.081	.095	.068	.036				.011	.004	.002	.002		
11	54.69	16.53	4.54	2.83	2.99	5.34	5.19	3.93	1.05	0.32	0.83	0.91	0.73	0.07	0.37	100.38	
A1. I	.912	.162	.028	.040	.075	.095	.084	.042				.011	.005	.001	.003		
12	52.47	18.23	3.31	3.85	2.85	4.56	4.83	3.81	2.03	0.68	1.01	0.97	0.64	0.15	0.23	99.82	
A1. I	.875	.179	.020	.054	.071	.081	.077	.040				.012	.005	.002	.002		
13	57.01	18.41	3.69	2.36	2.34	4.29	4.95	3.72	2.29			0.27	0.42	0.21		99.96	
A2. II	.950	.180	.023	.033	.059	.077	.080	.040				.003	.003	.003			
14	53.80	20.13	3.57	2.63	2.26	5.60	5.20	4.49	0.90			0.43	0.56	0.29		99.86	
A2. II	.897	.197	.022	.036	.047	.100	.084	.048				.005	.004	.004			
15	60.44	16.65	2.31	3.09	2.18	4.22	5.18	2.71	1.07	0.36	0.48	0.60	0.29	0.13	0.12	99.96	2.677
A1. I	1.007	.163	.014	.043	.055	.075	.084	.029				.008	.002	.002	.001		24°

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. AKEROSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 none FeS_2 0.07 Cr_2O_3 none V_2O_3 0.02 SrO 0.03 Li_2O trace	or 13.9 di 10.8 ab 36.2 ol 1.7 an 11.4 mt 11.4 ne 3.1 il 4.3 ap 2.2	Mapleton Township, Aroostook County, Maine.	W. F. Hillebrand.	H. E. Gregory, B. U. S. G. S., 165, p. 183, 1900.	Teschenite.	Not fresh.
ZrO_2 0.04 Cl 0.03 F 0.42 FeS_2 0.07 NiO trace	Q 2.8 di 6.0 or 19.5 hy 7.8 ab 47.7 mt 3.0 an 8.1 il 2.0 ap 1.0	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 68, 1897.	Segregation in granite.	
ZrO_2 0.03 Cl 0.07 F 0.19 FeS_2 trace NiO trace	or 22.2 di 13.2 ab 42.4 ol 3.7 an 8.6 mt 2.3 ne 2.6 il 2.6	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 69, 1897.	Segregation in granite-porphyry.	
ZrO_2 0.04 Cl 0.07 F 0.24 FeS_2 0.06 NiO trace?	or 17.8 di 6.8 ab 43.5 hy 10.9 an 13.3 ol 0.8 mt 1.9 il 2.3 ap 1.1	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 68, 1897.	Segregation in syenite.	
FeS_2 0.09 NiO 0.03	or 12.8 di 8.8 ab 47.7 hy 9.4 an 9.7 ol 2.4 mt 3.7 il 2.0 ap 1.3	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 68, 1897.	Segregation in granitite.	Sum low.
ZrO_2 trace SO_3 none Cl 0.07 F 0.28 FeS_2 0.07 NiO ?	Q 0.2 di 7.7 or 12.8 hy 10.5 ab 45.6 mt 2.3 an 13.9 il 3.1 ap 1.7	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 70, 1897.	Segregation in diorite.	
	Q 8.1 di 3.0 or 22.8 hy 4.3 ab 43.5 mt 3.5 an 12.5 il 1.7	Cottonwood Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed & Pirsson, B. U. S. G. S., 139, p. 88, 1896.	Dioritic syenite.	Inclusion in granite. Near laurvikose.
SrO 0.08 Li_2O trace	Q 10.0 di 1.1 or 22.8 hy 4.9 ab 40.3 mt 4.2 an 12.5 il 1.4 ap 1.5	Three Peaks, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 148, p. 142, 1897.	Porphyrite.	Near laurvikose.
SrO 0.05 Li_2O trace	or 31.7 di 8.0 ab 41.9 mt 4.6 an 6.4 il 1.2 ne 4.3 ap 0.7	Shield's River Basin, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 148, p. 143, 1897.	Syenite.	Near monzonose
SrO 0.10 Li_2O trace	Q 6.1 di 4.9 or 20.0 hy 6.2 ab 35.6 mt 7.0 an 15.8 il 1.5 ap 1.3	Shield's River Basin, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 148, p. 143, 1897.	Porphyrite.	
Cl trace SrO 0.06 Li_2O trace	or 23.4 di 9.0 ab 41.9 ol 2.4 an 10.0 mt 6.5 ne 1.1 il 1.7 ap 1.8	North Part of Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 148, p. 143, 1897.	Porphyrite.	
ZrO_2 0.02 FeS_2 0.04 Cr_2O_3 trace V_2O_3 0.03 NiO trace SrO 0.11	or 22.2 di 1.2 ab 39.8 ol 7.5 an 17.2 mt 4.6 ne 0.3 il 1.8 ap 1.4	Dike Mountain, Yellowstone National Park.	W. F. Hillebrand.	Hague and Jaggar, B. U. S. G. S., 168, p. 98, 1900.	Trachyte-andesite.	
	Q 2.2 di 1.7 or 22.2 hy 5.9 ab 41.9 mt 5.3 an 16.7 il 0.5 ap 1.0	Lookout Mountain, Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 231, 1896.	Andesite.	
	or 26.7 di 4.5 ab 33.0 ol 2.6 an 18.1 mt 5.1 ne 6.0 il 0.8 ap 1.4	Mount Fairvew, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 324, 1896.	Augite-diorite.	
S trace V_2O_3 0.02 NiO none SrO 0.11 Li_2O trace	Q 7.7 di 5.7 or 16.1 hy 5.5 ab 44.0 mt 3.2 an 18.9 il 1.2	La Plata Mountains, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 148, p. 181, 1897.	Diorite-porphyry.	Complete in B. U.S.G.S. 168, p. 162, 1900.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
16	55.53	16.78	4.06	3.35	3.00	6.96	4.31	3.57	0.55	0.09	0.09	0.95	0.47	0.16	0.13	100.17	2.79
A1. I	.926	.164	.025	.047	.075	.125	.069	.038				.012	.003	.002	.001		21°
17	54.34	19.23	3.19	2.11	1.28	4.53	6.38	5.14	1.17	0.14		1.09	0.27	0.08	0.24	99.77	2.68
A1. I	.906	.189	.020	.030	.032	.081	.103	.055				.013	.002	.001	.002		
18	49.84	17.78	5.86	2.62	3.02	7.35	5.20	3.04	2.02	0.34	0.52	1.43	0.76	0.21	0.22	100.42	
A1. I	.831	.174	.037	.036	.076	.131	.084	.032				.017	.005	.003	.002		
19	61.26	16.15	4.39	2.66	2.91	5.75	4.93	2.65	0.15							100.85	
B3. IV	1.021	.158	.027	.037	.073	.102	.079	.028									
20	60.09	19.04	3.14	1.89	4.20	2.91	5.26	2.95	0.98							100.46	
A3. III	1.002	.186	.020	.027	.105	.051	.085	.032									
21	59.54	13.04	4.74	6.13	1.33	3.81	5.88	3.86	0.68		0.18		0.59	0.49		100.32	
A3. III	.992	.128	.029	.085	.033	.068	.095	.041					.004	.007			
22	59.06	16.79	3.47	4.81	3.00	5.22	4.60	2.79	0.95							100.69	
A3. III	.984	.164	.022	.067	.075	.093	0.74	.030									
23	59.56	17.60	2.90	3.38	1.87	3.67	4.88	4.40	1.37			1.22		0.03		101.32	2.729
C2. IV	.976	.173	.018	.047	.047	.066	.079	.047				.015		—			
24	58.48	19.24	5.75	n. d.	0.99	5.02	5.52	3.06	0.47			0.96		trace		99.41	
B4. V	.975	.189	.036	(.072)	.025	.090	.087	.033				.012		—			
25	51.22	17.56	3.51	4.34	3.22	4.52	5.72	4.37	1.93		0.60	1.70	1.08	0.20		99.97	
A2. II	.854	.172	.022	.060	.081	.081	.092	.046				.021	.008	.003			
26	55.17	13.49	3.10	3.55	8.55	3.15	4.43	1.09	4.27		3.27			0.39		100.46	
A3. III	.920	.132	.020	.050	.214	.056	.071	.012						.006			
27	53.12	20.48	5.13	1.50	1.88	4.29	6.20	4.88	2.25			0.25	0.43			100.59	2.674
A2. II	.885	.201	.032	.021	.047	.076	.100	.052				.003	.003				
28	60.22	16.96	6.34	0.80	1.05	3.19	5.53	4.32	1.53			trace	0.44			100.45	2.662
A2. II	1.004	.166	.039	.011	.026	.057	.089	.046				—	.003				
29	58.04	16.78	5.13	3.63	2.62	4.52	5.41	4.14	0.57					trace		100.84	
A3. III	.967	.164	.031	.050	.066	.080	.087	.044						—			
30	57.90	16.01	5.82	4.21	2.34	5.11	4.46	3.73	0.98					trace		100.56	
A3. III	.965	.157	.036	.058	.059	.091	.072	.039									
31	53.60	14.43	1.62	8.70	0.41	8.00	5.61	2.03	2.02		0.52	1.98	0.16			100.16	
A2. II.	.893	.141	.010	.121	.010	.143	.090	.021				.025	.001				
32	53.26	16.63	8.29	3.21	1.10	7.30	5.31	3.54	1.43			0.31				100.38	2.671
A3. III	.888	.163	.052	.044	.028	.130	.085	.037				.004					

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. AKEROSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
FeS_2 V_2O_3 NiO SrO Li_2O	0.04 0.02 trace 0.11 trace	Q 1.6 or 21.1 ab 36.2 an 15.8	di 12.9 hy 2.7 mt 5.8 il 1.8 ap 1.1	La Plata Mountains, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 148, p. 181, 1897.	Diorite.	Complete in B. U.S.G.S. 168, p. 162, 1900.
ZrO_2 SO_3 Cl V_2O_3 SrO Li_2O	0.07 0.07 0.28 0.02 0.16 trace	or 30.6 ab 34.1 an 9.2 ne 6.0 so 3.9	di 6.9 wo 1.3 mt 4.6 il 2.0 ap 0.7	Longfellow Mine, Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, 16 A. R. U. S. G. S., II, p. 45, 1895.	Nephelite-syenite.	Near essexose.
ZrO_2 SO_3 Cl V_2O_3 SrO Li_2O	0.02 none trace 0.03 0.18 trace	or 17.8 ab 30.4 an 16.1 ne 7.4	di 12.0 ol 1.4 mt 4.4 il 2.6 ap 1.8	Bull Cliff, Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 148, p. 162, 1897.	Local facies of phonolite.	
		Q 8.6 or 15.6 ab 41.4 an 14.2	di 11.3 hy 3.2 mt 6.3	Lava of 1869, Pasta Volcano, Colombia.	R. Küch.	R. Küch, G. Stud. Colomb., I, p. 141, 1892.	Pyroxene-andesite.	
		Q 5.2 or 17.8 ab 44.5 an 14.2 C 1.8	hy 11.4 mt 4.6	Misti Volcano, Arequipa, Peru.	F. H. Hatch.	F. H. Hatch, T. M. P. M., VII, p. 328, 1886.	Pyroxene-andesite.	"Silicified."
		Q 1.7 or 22.8 ab 45.6	ac 3.7 di 13.3 hy 6.3 mt 4.9 ap 1.4	Tamaya, Chile.	C. Schwarz.	A. v. Groddeck, Z. D. G. G., XXXIX, p. 251, 1887.	Porphyrite.	
		Q 1.6 or 16.7 ab 38.8 an 16.7	di 19.9 hy 2.9 mt 5.1	Cuesta del Cuzco, San Antonio Valley, Argentina.	B. Wetzig.	A. Stelzner, Btr. G. Arg. Rep., I, p. 212, 1885.	Andendiorite.	
		Q 2.8 or 26.1 ab 41.4 an 13.1	di 4.5 hy 4.4 mt 4.2 il 2.3	Vettakollen, n. Christiania, Norway.	P. Jannasch.	H. O. Lang, Nyt Mag., XXX, p. 40, 1884.	Syenite. (Akerite, W. C. B.)	Also in W. C. Brögger, Z. K., XVI, p. 50, 1890.
		Q 0.7 or 18.3 ab 45.6 an 19.2	di 5.0 hy 7.9 il 1.8	Ramnäs, Christiania Region, Norway.	R. Mauzelius.	W. C. Brögger, Z. K., XVI, p. 46, 1890.	Akerite.	
		or 25.6 ab 32.0 an 9.5 ne 8.8	di 5.3 ol 5.6 mt 5.1 il 3.2 ap 2.5	Brathagen, Laugendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 130, 1899.	Soda-minette.	
		Q 4.4 or 6.7 ab 37.2 an 13.6	di 1.5 hy 24.6 mt 4.6	Vera, Cabo de Gata, Spain.	A. Osann.	A. Osann, Z. D. G. G., XLI, p. 311, 1889.	Verite.	Not fresh.
SO_3 Cl	0.14 0.28	or 28.9 ab 32.5 an 15.0 ne 8.8	di 2.0 ol 2.6 mt 4.2 il 0.5 hm 2.2 ap 1.0	Bauza, Columbretes Islands, Spain.	R. Pfohl.	F. Becke, T. M. P. M., XVI, p. 168, 1896.	Trachyte.	SO_3 and Cl from sea water.
SO_3	0.07	Q 5.4 or 25.6 ab 46.6 an 8.6	di 3.4 hy 1.0 mt 2.6 hm 4.5 ap 1.0	Wambacher Hof, Pfalz, Germany.	K: Klüss.	A. Leppla, Jb. Pr. G. L-A., XIV, p. 139, 1894.	Porphyrite.	Iron oxides? Near laurvikose.
Cl	trace	or 24.5 ab 45.6 an 9.2	di 10.6 hy 0.4 ol 2.4 mt 7.2	Bruder Kunzberg, n. Honnef, Siebengebirge.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn., LIII, p. 48, 1896.	Trachyte.	Light colored.
		Q 4.9 or 21.7 ab 37.7 an 12.8	di 10.2 hy 3.9 mt 8.4	Bruder Kunzberg, n. Honnef, Siebengebirge.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn., LIII, p. 48, 1896.	Trachyte.	Dark colored.
SO_3 X	0.15 0.93	or 11.7 ab 41.4 an 8.3 ne 3.1	di 23.8 wo 1.9 mt 2.3 il 3.7	Gottsbüren, Reinhardswald, Rh. Prussia.	P. Jannasch.	F. Rinne, Jb. Pr. G.L-A., XIII, p. 98*, 1893.	Basalt.	MgO low?
		or 20.6 ab 38.8 an 11.4 ne 3.1	di 6.1 wo 7.2 mt 9.3 il 0.6 hm 1.9	Kauling-Beilstein, n. Kreuzberg, Rhöngebirge.	E. v. Seyfried.	E. v. Seyfried, cf. N. J., 1898, II, p. 61.	Tephrite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
33	54.32	17.36	2.32	6.14	3.04	3.11	3.83	3.27	4.52		1.51	1.18	trace			100.68	2.665
A2. II	.905	.170	.014	.085	.076	.055	.061	.035				.015	—				
34	52.23	17.40	1.90	5.40	6.50	2.86	4.30	1.85	5.58		0.75	1.19	0.31			100.46	2.637
A2. II	.871	.171	.012	.075	.163	.051	.070	.020				.015	.002				
35	56.18	15.51	2.86	3.94	5.46	3.69	4.07	3.21	3.19		0.95	0.45	0.31			99.82	
A2. II	.936	.152	.018	.055	.137	.066	.066	.034				.006	.002				
36	55.02	18.14	6.03	1.32	2.12	6.67	4.55	4.03	2.08			trace	0.63			100.59	2.698
A2. II	.917	.178	.037	.018	.053	.120	.073	.042				—	.004				
37	53.58	19.78	3.91	2.76	3.01	7.55	5.33	3.61	0.65							100.18	
A3. III	.893	.195	.024	.039	.075	.135	.085	.038									
38	60.98	15.64	4.28	1.80	1.60	4.62	5.25	3.79	1.00			0.41	0.36			99.93	2.659
A2. II	1.016	.153	.027	.025	.040	.082	.085	.040				.005	.002				11°
39	58.06	18.21	4.87	2.01	1.59	3.29	6.12	2.75	—	—		1.88	0.65	0.36		99.99	
A1. I	.968	.178	.030	.028	.040	.059	.098	.030				.023	.005	.005			

RANG 2. DOMALKALIC. MONZONASE.

1	52.59	15.93	6.12	3.96	5.04	5.55	5.79	0.67	2.16	0.16	none	1.36	0.15	0.25		99.73	
A2. II	.877	.156	.038	.055	.126	.099	.093	.007				.017	.001	.004			
2	56.51	14.07	4.04	4.65	3.95	8.44	5.32	0.79	1.51		none	0.19	0.23	trace		99.70	
A2. II	.942	.138	.025	.065	.099	.150	.085	.008				.002	.002	—			
3	57.76	18.64	3.88	0.18	1.79	6.56	7.44	1.52	1.08			0.08		1.06		99.99	2.684
A2. II	.963	.183	.024	.003	.045	.117	.120	.016				.001		.015			
4	54.23	15.22	2.84	9.47	2.93	8.56	5.80	0.92	1.00							100.97	
B3. IV	.904	.149	.017	.133	.072	.152	.093	.010									

RANG 3. ALKALICALCIC. ANDASE.

1	50.81	15.13	2.40	3.52	10.64	4.96	1.01	7.01	3.07		trace	1.71	0.62	trace		100.88	
A2. II	.847	.148	.015	.049	.266	.088	.016	.074				.021	.004	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. AKEROSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.08	Q 5.5 hy 14.6 or 19.5 mt 3.2 ab 32.0 il 2.2 an 15.3 C 1.9	Pfeffelbach, St. Wendel, Harz Mountains.	Fischer.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 316, 1892.	Porphyrite.	Not fresh.
SO_3 0.10 Org 0.09	Q 1.0 hy 22.7 or 11.1 mt 2.8 ab 36.7 il 2.2 an 14.2 C 3.0	Pfeffelbach, n. St. Wendel, Harz Mountains.	Hesse.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 316, 1892.	Diabase?	SO_3 for S. Not fresh. Near andose.
SO_3 trace	Q 3.3 di 3.2 or 18.9 hy 16.4 ab 34.6 mt 4.2 an 14.5 il 0.9	Wüstewaltersdorf, Silesia.	A. Steffen.	E. Dathe, Z. D. G. G., XXXVII, p. 1035, 1885.	Kersantite.	Not fresh.
SO_3 none Cl trace	Q 0.4 di 8.8 or 23.4 hy 1.2 ab 38.3 mt 4.2 an 17.5 hm 3.0 ap 1.5	Kolme Scheibe, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XV, p. 258, 1896.	Hauyne-tephrite.	No SO_3 or Cl? Probably does not belong here.
	or 21.1 di 14.1 ab 27.8 ol 1.9 an 20.0 mt 5.6 ne 9.1	Beresowska, Perm, Russia.	Loewinson-Lessing.	Loewinson-Lessing, G. Sk. Jushno-Sao., p. 244, 1900.	Syenite-diorite.	
	Q 7.7 di 8.8 or 22.2 mt 6.0 ab 44.5 il 0.8 an 7.8 ap 1.0	Kedabeg, Karabagh Distr., Transcaucasus.	A. Röhrig.	C. R. Thost, Abh. Senkb. N. Ges., XVIII, p. 221, 1894.	Augite-granite.	Not fresh.
SO_3 0.05 S 0.05 CuO 0.10	Q 3.6 hy 4.0 or 16.7 mt 1.2 ab 51.4 il 3.5 an 13.9 hm 4.0 ap 1.6	Kohala Mountain, Waimea, Hawaii.	A. B. Lyons.	A. B. Lyons, A. J. S. II, p. 424, 1896.	Andesite.	Calc. to 100 per cent after deducting H_2O $H_2O+0.83$ $H_2O-0.53$.

SUBRANG 5. PERSODIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 3.9 di 9.3 ab 48.7 hy 7.5 an 15.6 ol 0.5 mt 8.8 il 2.6	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, M. U. S. G. S., XXXVI, p. 106, 1899.	Meta-basalt.	
S trace	Q 3.0 di 23.7 or 4.4 hy 3.7 ab 44.5 mt 5.8 an 12.5	Grenada, West Indies.	J. B. Harrison.	J. B. Harrison, Rocks of Grenada, London, 1896, p. 10.	Augite-enstatite-andesite.	Average sample.
	or 8.9 di 9.7 ab 55.0 wo 2.9 an 13.1 mt 1.4 ne 4.3 hm 3.3	Lindenberg, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kt. Hesse, I. Bl. Rossdorf, p. 54, 1886.	Syenite.	Calc. to 100?
	or 5.6 di 24.8 ab 40.9 ol 7.5 an 12.8 mt 3.9 ne 4.3	Victoria Range, Westland, New Zealand.	W. A. MacLeod.	W. A. MacLeod, Tr. N. Z. Inst., XXXI, p. 487, 1899.	Dolerite.	Sum high.

SUBRANG 2. DOPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl trace	or 41.4 di 3.9 ab 8.4 hy 5.4 an 16.1 ol 14.7 mt 3.5 il 3.2 ap 1.4	Plauensche Grund, Dresden, Saxony.	B. Doss.	B. Doss, T. M. P. M., XI, p. 27, 1890.	Augite-minette.	Not fresh.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	58.51	16.32	2.11	4.43	3.73	3.92	3.11	4.08	2.00	0.23	none	0.72	0.30	trace		99.46	
A1. I	.975	.160	.013	.061	.093	.070	.050	.043				.009	.002	—			
2	57.97	15.65	0.73	2.80	4.96	10.93	3.03	3.16	0.38	0.22		0.60	0.15	trace	0.09	100.69	
A1. I	.966	.152	.005	.039	.124	.195	.049	.034				.007	.001	—	.001		
3	51.00	17.21	4.23	2.41	6.19	9.15	2.88	4.93	0.63			0.13	0.33	trace	0.34	99.60	
A1. I	.850	.169	.026	.033	.155	.163	.047	.053				.002	.002	—	.002		
4	52.33	15.09	4.31	4.03	6.73	7.06	3.14	3.76	2.68			0.14	1.02	0.09	0.07	100.45	2.785
A1. I	.872	.148	.027	.056	.168	.126	.051	.040				.002	.007	.001	.001		
5	54.97	18.38	3.06	4.22	2.38	5.43	3.45	3.37	0.82		2.92	0.97	0.42	trace		100.45	
A1. I	.916	.180	.020	.058	.060	.097	.056	.036				.012	.003	—			
6	56.05	19.70	3.74	2.32	2.51	4.34	3.29	4.44	1.86			0.98	0.66	trace		100.14	
A1. I	.934	.193	.023	.032	.063	.077	.053	.047				.012	.005	—			
7	54.86	17.28	4.08	2.28	4.19	5.42	3.94	3.96	2.16			0.69	0.48	0.19	0.37	99.90	
A1. I	.914	.169	.025	.032	.105	.096	.063	.042				.009	.003	.003	.003		
8	53.49	17.19	4.73	3.25	4.42	6.34	3.23	3.86	2.17			0.71	0.43	0.14	0.06	100.02	
A1. I	.892	.169	.029	.045	.111	.113	.052	.041				.009	.003	.002	—		
9	52.93	19.67	3.07	3.50	2.88	4.69	4.20	4.75	2.73			0.72	0.59	0.15	0.21	100.09	
A1. I	.882	.193	.020	.049	.072	.084	.068	.051				.009	.004	.002	.002		
10	52.86	17.51	5.18	3.31	4.18	6.51	3.22	3.41	1.76			1.04	0.53	trace		99.93	
A1. I	.881	.174	.032	.046	.105	.116	.051	.036				.012	.003	—			
11	52.49	17.89	5.76	2.08	3.49	7.01	3.18	3.73	2.63			0.81	0.55	0.09	0.30	100.01	
A1. I	.875	.175	.036	.030	.087	.125	.051	.039				.010	.004	.001	.002		
12	52.11	16.58	3.66	4.99	6.87	6.43	3.25	3.20	1.99			0.53	0.63	0.23		100.47	
A2. II	.869	.163	.023	.070	.172	.115	.052	.034				.006	.004	.003			
13	51.75	17.48	6.42	1.46	4.05	8.20	3.33	3.72	2.26			0.86	0.67	trace		100.37	
A1. I	.863	.172	.040	.020	.101	.146	.054	.039				.011	.005	—			
14	51.56	21.00	5.17	2.76	2.52	4.83	4.37	4.13	2.27			0.65	0.69	trace		100.29	
A1. I	.859	.206	.032	.039	.063	.086	.071	.044				.008	.005	—			
15	51.17	16.14	4.11	4.48	4.82	7.72	2.99	3.54	2.24	0.63	none	1.01	0.48	0.21	0.20	99.94	
A1. I	.853	.158	.025	.062	.121	.137	.048	.037				.012	.003	.003	.001		

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODIPOTASSIC. SHOSHONOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cr_2O_3 none NiO none	Q 9.0 di 0.8 or 23.9 hy 14.0 ab 26.2 mt 3.0 an 18.6 il 1.4	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, J. G., VI, p. 378, 1898.	Mica-diorite.	Also in M. U. S. G.S., XXXVI, p. 231, 1899.
Cl trace F trace SrO 0.02 Li_2O trace	Q 3.1 di 27.8 or 18.9 hy 2.7 ab 25.7 mt 1.2 an 19.5 il 1.1	Rock Creek, Crazy Mts., Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 148, p. 144, 1897.	Diorite.	
SO_3 0.03 Cl trace SrO 0.14	or 29.5 di 18.8 ab 11.5 ol 5.4 an 19.2 mt 6.0 ne 7.7 ap 0.7	Highwood Peak, Highwood Mts., Montana.	E. B. Hurlbut.	L. V. Pirsson, B. U. S. G. S., 148, p. 154, 1897.	Monzonite.	
	or 22.2 di 10.1 ab 26.7 hy 9.3 an 15.8 ol 4.7 mt 6.3 ap 2.3	Cottonwood Creek, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 648, 1895.	Augite-porphyrite.	
SO_3 0.03 Cl trace Li_2O 0.03	Q 6.1 hy 9.5 or 20.0 mt 4.6 ab 29.3 il 1.8 an 24.5 ap 1.0	Baldy Mountain, Bear Gulch, Montana.	J. P. Whitfield.	J. P. Iddings, B. U. S. G. S., 148, p. 129, 1897.	Shoshonite.	
SO_3 0.19 Li_2O 0.06	Q 7.0 hy 6.3 or 26.1 mt 5.3 ab 27.8 il 1.4 an 21.4 C 1.6	Two Ocean Pass, Yellowstone National Park.	J. P. Whitfield.	J. P. Iddings, J. G., III, p. 944, 1895.	Shoshonite.	Also in M. U. S. G.S., XXXII, p. 340, 1899.
	Q 1.8 di 4.2 or 23.4 hy 8.6 ab 33.0 mt 5.8 an 18.1 il 1.2 ap 1.1	Indian Peak, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 944, 1895.	Shoshonite.	Also in M. U. S. G.S., XXXII, p. 340, 1899. Near monzonose.
	Q 2.1 di 6.1 or 22.8 hy 9.2 ab 27.2 mt 6.7 an 21.1 il 1.4 ap 1.0	Beaverdam Creek, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 944, 1895.	Shoshonite.	Also in M. U. S. G.S., XXXII, p. 340, 1899. Probably same as No. 10 below.
	or 28.4 di 2.3 ab 30.4 ol 6.3 an 20.6 mt 4.6 ne 2.8 il 1.4 ap 1.2	Beaverdam Creek, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 944, 1895.	Leucite-banakite.	Also in M. U. S. G.S., XXXII, p. 349, 1899. Same rock as No. 14 below.
SO_3 0.22 Cl 0.16 Li_2O 0.04	Q 3.2 di 4.3 or 20.0 hy 8.7 ab 26.7 mt 7.4 an 24.2 il 1.8 ap 1.1	Beaverdam Creek, Yellowstone National Park.	J. P. Whitfield.	J. P. Iddings, B. U. S. G. S. 148, p. 129, 1897.	Shoshonite.	Also in M. U. S. G.S., XXXII, p. 340, 1899. Probably same as No. 8 above.
	Q 3.2 di 5.3 or 21.7 hy 5.1 ab 26.7 mt 4.6 an 23.6 il 1.5 ap 1.4	Near Pyramid Peak, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 944, 1895.	Leucite? Shoshonite.	Also in M. U. S. G.S., XXXII. p. 340, 1899.
	or 18.9 di 5.9 ab 27.2 hy 11.6 an 21.4 ol 5.9 mt 5.3 il 0.9 ap 1.3	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 260, 1899.	Orthoclase-basalt.	
SO_3 0.17 Cl trace Li_2O trace	or 21.7 di 10.8 ab 28.3 hy 4.3 an 22.0 ol 0.5 mt 2.3 il 1.6 hm 4.8 ap 1.7	Sepulchre Mountain, Yellowstone National Park.	J. P. Whitfield.	J. P. Iddings, M. S. G. S., XXXII, p. 340, 1899.	Shoshonite.	
SO_3 0.21 Cl trace Li_2O 0.13	or 24.5 ol 4.4 ab 32.5 mt 7.4 an 23.9 il 1.1 ne 2.6 ap 1.7	Beaver Dam Creek, Yellowstone National Park.	J. P. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, p. 349, 1899.	Leucite-banakite.	Same rock as No. 9 above.
ZrO_2 none FeS_2 0.05 Cr_2O_3 trace V_2O_3 0.04 NiO 0.01 SrO 0.10	or 20.6 di 12.4 ab 25.2 hy 8.5 an 20.3 ol 0.6 mt 5.8 il 1.8 ap 1.1	Dike Mountain, Yellowstone National Park.	W. F. Hillebrand.	Hague and Jaggar, B. U. S. G. S., 168, p. 98, 1900.	Augite-andesite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
16	50.29	15.85	8.22	1.43	4.65	7.71	2.98	3.53	1.98	1.77	none	0.96	0.51	0.15	0.15	100.27	
A1. I	.838	.155	.051	.020	.116	.137	.048	.037				.012	.003	.002	.001		
17	50.06	17.00	2.96	5.42	3.61	8.14	3.53	3.40	4.85			0.51	0.66	0.14		100.28	
A2. II	.834	.167	.024	.075	.090	.145	.057	.036				.006	.005	.002			
18	56.90	18.50	0.17	4.61	5.10	6.17	2.99	4.14	0.51			0.19	0.79	trace		100.07	
A2. II	.948	.181	.001	.064	.127	.110	.048	.044				.002	.005	—			
19	52.59	17.91	3.81	5.18	4.11	7.24	2.94	3.83	1.24			0.84	0.14	trace		99.88	2.83
A2. II	.877	.175	.024	.072	.103	.129	.047	.040				.010	.001	—			22°.5
20	49.69	18.06	2.64	6.19	5.73	8.24	2.99	3.90	0.91			0.85	0.81	0.13		100.27	
A2. II	.828	.177	.016	.086	.143	.147	.048	.041				.011	006	.002			
21	48.25	16.73	3.99	6.28	5.77	8.32	3.24	4.08	1.72			0.89	0.68	trace	0.01	100.16	
A1. I	.804	.164	.025	.088	.144	.148	.052	.048				.011	.005	—	—		
22	54.20	15.86	3.32	4.14	3.51	5.32	3.28	3.30	2.40	0.55	1.45	1.35	0.68	0.19	0.41	100.28	
A1. I	.903	.156	.021	.058	.088	.095	.053	.035				.017	.005	.003	.003		
23	56.78	16.86	3.56	2.93	3.41	6.57	3.19	3.48	1.21	0.15	0.18	1.15	0.42			99.89	2.67
A2. II	.946	.165	.022	.040	.085	.118	.051	.037				.014	.003				
24	56.19	16.76	3.05	4.18	3.79	6.53	2.53	4.46	0.66	0.34		0.69	0.55	0.10	0.19	100.02	
A1. I	.937	.164	.020	.058	.095	.117	.041	.048				.009	.004	.001	.001		
25	47.6	17.6	4.8	5.8	5.0	8.6	2.3	4.3	2.2			1.6				99.8	
A3. III	.792	.172	.030	.080	.125	.153	.037	.046				.020					
26	47.1	18.1	3.0	8.5	7.3	6.6	2.4	2.8	3.6			0.4		0.1		99.9	
A3. III	.785	.177	.019	.118	.183	.118	.039	.030				.005		.001			
27	58.20	19.20	1.10	3.52	2.01	3.67	3.60	4.55	1.40		2.40					99.65	
A3. III	.970	.188	.007	.049	.050	.066	.058	.049									
28	59.41	17.92	1.71	2.40	2.99	4.65	2.63	5.60	1.30			0.01	0.87			99.49	
A3. III	.990	.175	.011	.033	.077	.083	.042	.060				—	.006				
29	47.50	17.57	7.24	5.08	3.31	7.09	3.60	3.28	1.70		0.30	3.02	0.48			100.17	
A2. II	.792	.172	.045	.071	.083	.127	.058	.035				.036	.003				
30	55.19	16.42	5.20	4.28	2.31	8.23	2.82	3.79	2.26							100.50	2.748
A3. III	.920	.161	.032	.060	.058	.146	.045	.040									
31	51.98	18.84	4.98	5.40	2.77	6.13	3.04	3.60	2.58							99.32	
A3. III	.866	.185	.031	.075	.069	.109	.049	.038									
32	54.23	14.37	2.26	4.76	7.71	7.00	2.56	3.30	1.79		0.59	0.89	0.48			100.09	2.779
A2. II	.904	.141	.014	.066	.193	.125	.041	.035				.011	.003				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODIPOTASSIC. SHOSHONOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl NiO SrO Li_2O	trace trace 0.09 trace	Q 0.9 or 20.6 ab 25.2 an 19.5	di 12.3 hy 5.9 mt 1.9 il 1.8 hm 6.9 ap 1.1	Deer Creek, Yellowstone National Park.	W. F. Hillebrand.	Hague and Jaggar, B. U. S. G. S., 168, p. 97, 1900.	Gabbro-porphyry.	
		or 20.0 ab 27.2 an 20.7 ne 1.4	di 12.3 ol 6.5 mt 5.6 il 0.9 ap 1.7	Lamar River, North Bison Peak, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 944, 1895.	Shoshonite.	Also in M. U. S. G.S., XXXII, p. 340, 1899.
Cl	trace	Q 1.3 or 24.5 ab 25.2 an 24.7	di 1.4 hy 21.3 mt 0.4 ap 1.7	Turkey Creek, Jefferson County, Colorado.	L. G. Eakins.	W. Cross, M. U. S. G. S., XXVII, p. 310, 1896.	Augite-mica-syenite.	
Cl	0.05	or 22.2 ab 24.6 an 24.5	di 9.4 hy 10.1 ol 0.4 mt 5.6 il 1.5	Table Mountain, Denver, Colorado.	W. F. Hillebrand.	W. Cross, M. U. S. G. S., XXVII, p. 306, 1896.	Basalt.	Late flow.
Cl	0.13	or 22.8 ab 19.4 an 24.5 ne 3.1	di 9.4 ol 12.8 mt 3.7 il 1.7 ap 1.9	Table Mountain, Denver, Colorado.	W. F. Hillebrand.	W. Cross, M. U. S G. S., XXVII, p. 308, 1896.	Basalt.	Early flow.
SO_3 Cl	0.12 0.08	or 23.9 ab 14.7 an 19.2 ne 6.8	di 14.6 ol 10.3 mt 5.8 il 1.7 ap 1.6	Valmont, Boulder County, Colorado.	L. G. Eakins.	W. Cross, M. U. S. G. S., XXVII, p. 301, 1896.	Dolerite.	Near kentallenose.
FeS_2 NiO SrO Li_2O	0.26 0.02 0.04 trace	Q 7.1 or 19.5 ab 27.8 an 18.9	di 2.7 hy 10.2 mt 4.9 il 2.6 ap 1.6	Lane and Hayward Mine, Silver Bow Basin, Alaska.	W. F. Hillebrand.	G. F. Becker, B. U. S. G. S., 148, p. 233, 1897.	Diorite.	Not fresh.
		Q 8.6 or 20.6 ab 26.7 an 21.4	di 8.0 hy 5.8 mt 5.1 il 2.2 ap 1.0	Clover Meadow, Tuolumne County, California.	G. Steiger.	F. L. Ransome, A. J. S., V, p. 363, 1898.	Augite-latite.	Also in B. U. S. G. S., 89, p. 58, 1898.
SrO Li_2O	trace trace	Q 5.9 or 26.7 ab 21.5 an 20.9	di 6.8 hy 10.1 mt 4.6 il 1.2 ap 1.2	Table Mountain, Tuolumne County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 491, 1894.	Basalt. (Augite-latite, F. L. R.)	Also cf. F. L. Ransome, A. J. S., V, p. 363, 1898.
		or 25.6 ab 12.0 an 24.7 ne 4.0	di 14.3 ol 7.0 mt 7.0 il 3.1	Malvern, England.	J. H. Player.	C. Callaway, Q. J. G. S., XLIX, p. 419, 1893.	Diorite.	One decimal.
		or 16.7 ab 20.4 an 30.0	di 2.3 hy 1.5 ol 19.5 mt 4.4 il 0.8	Swinyards Hill, Malvern, England.	J. H. Player.	C. Callaway, Q. J. G. S., XLIX, p. 420, 1893.	Diorite.	One decimal.
		Q 6.2 or 27.2 ab 30.4 an 18.3 C 1.5	hy 10.5 mt 1.6	Hôpital-Camfront, Brittany, France.	Not stated.	C. Barrois, Guide Exc. VIII, Cong. G. Int., VII, p. 19, 1900.	Kersantite.	Near pulaskose.
		Q 7.4 or 33.4 ab 22.0 an 20.3	di 2.2 hy 9.6 mt 2.6	Cabezo Felipe, Cartagena, Spain.	A. Osann.	A. Osann, Z. D. G. G., XLIII, p. 719, 1891.	Andesite	
		or 19.5 ab 27.2 an 22.0 ne 1.7	di 8.2 ol 3.2 mt 8.1 il 5.5 hm 1.6 ap 1.1	Huken, Christiania Fjord, Norway.	L. Schmelck.	W. C. Brögger, Q. J. G. S., L, p. 33, 1894.	Labrador-porphyrite.	
		Q 6.1 or 22.2 ab 23.6 an 21.1	di 15.8 hy 1.8 mt 7.4	Gebweiler, Vogesen.	V. Traumann.	A. Osann, Abh. Sp. K. Els.-Loth., III, p. 117, 1887.	Labrador-porphyrite.	
		Q 1.4 or 21.1 ab 25.7 an 27.2	di 2.5 hy 11.4 mt 7.2	Masmünster, Vogesen.	A. Walther.	A. Osann, Abh. Sp. K. Els.-Loth., III, p. 125, 1887.	Labrador-porphyry.	Sum low.
SO_3	0.15	Q 2.0 or 19.5 ab 21.5 an 18.1	di 11.1 hy 19.4 mt 3.2 il 1.7 ap 1.1	Söterburg, Nahethal, Rh. Prussia.	Böttcher.	K. A. Lossen, Jb. Pr. G-L. A., X, p. 309, 1892.	Olivine-weiselbergite.	SO_3 for S.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
33	52.25	14.93	3.50	3.70	5.84	6.33	2.86	3.76	2.68		2.62	0.62	0.62			99.92	2.725
A2. II	.871	.146	.022	.051	.146	.112	.046	.040				.008	.004				
34	50.31	16.72	4.19	5.01	6.69	7.73	2.50	2.53	3.16		0.13	0.64				99.98	2.777
A2. II	.839	.164	.026	.070	.167	.137	.040	.026				.008					
35	51.80	16.65	4.93	2.14	6.90	7.35	3.68	4.05	1.32		0.50			0.29		99.61	
A3. III	.863	.163	.030	.030	.173	.131	.059	.043						.004			
36	54.55	15.44	3.48	0.80	4.41	7.85	2.45	4.09	3.75		2.16	0.96	0.45			100.49	2.67
A2. II	.909	.152	.022	.011	.110	.140	.040	.043				.012	.003				
37	51.53	18.28	4.89	2.11	1.69	5.10	3.01	4.74	6.90			1.33	0.46	0.18		100.29	2.554
A2. II	.859	.179	.031	.030	.042	.091	.048	.050				.016	.003	.002			
38	50.98	18.94	5.82	1.83	0.32	6.88	3.22	4.67	4.01			1.23	0.21			98.11	2.548
D2. V	.850	.185	.036	.025	.008	.123	.052	.050				.015	.001				
39	50.08	18.87	3.48	3.49	2.14	6.70	4.10	4.58	4.17		0.26	1.39	0.39	0.29		100.16	2.651
A1. I	.835	.185	.022	.049	.054	.120	.066	.049				.017	.003	.004			
40	50.52	17.98	5.09	5.90	3.36	7.95	3.60	3.70	1.03			trace	1.31			100.44	2.855
A3. III	.842	.176	.032	.082	.084	.143	.058	.039				——	.009				
41	49.75	16.72	5.70	4.99	3.89	9.69	3.08	3.02	2.18			0.18	0.72			99.92	2.857
A2. II	.829	.164	.036	.069	.097	.173	.050	.033				.002	.005				
42	54.56	16.49	1.02	5.65	8.57	7.95	2.07	3.35	0.15	——		1.10		trace		100.91	
B2. III	.909	.162	.006	.078	.214	.142	.033	.036				.013		——			
43	54.14	16.42	1.69	5.26	8.44	8.05	2.20	3.34	0.56			1.23		trace		101.33	
B2. III	.902	.161	.011	.073	.211	.144	.035	.036				.015		——			
44	56.76	16.79	2.07	6.95	1.63	6.01	2.43	4.67	2.44				0.47			100.22	2.470
B3. IV	.946	.165	.013	.097	.041	.107	.039	.050					.003				
45	56.32	18.17	2.23	6.47	2.84	5.33	1.80	4.18	2.15				0.34			99.83	2.520
B3. IV	.939	.178	.014	.090	.071	.095	.029	.045					.002				
46	58.78	16.97	1.13	2.10	1.46	7.27	3.67	4.18	3.60				0.32	0.17		100.09	
A3. III	.980	.167	.007	.030	.037	.130	.059	.045					.002	.002			
47	55.69	19.08	4.07	3.26	3.41	6.87	2.89	4.41	0.17					trace		99.85	2.717
A3. III	.928	.187	.025	.045	.085	.123	.047	.047						——			
48	52.12	18.47	3.40	4.77	5.11	8.71	3.07	3.29	0.46			trace	0.25	trace		99.65	
A3. III	.869	.181	.021	.067	.128	.155	.050	.035				——	.002	——			
49	53.31	17.34	9.01	2.00	0.73	9.06	3.42	3.35	0.14					1.44		99.80	2.686
A3. III	.889	.170	.056	.028	.018	.161	.055	.036						.021			15°

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODIPOTASSIC. SHOSHONOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.21	Q 1.7 di 8.7 or 22.2 hy 13.4 ab 24.1 mt 5.1 an 16.7 il 1.1 ap 1.4	Breitenbrunnen, Querbachthal, Thüringerwald.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L-A., VIII, p. 112, 1888.	Kersantite.	SO_3 for S. Not fresh.
SO_3 trace	Q 0.3 di 8.7 or 14.5 hy 17.2 ab 21.0 mt 6.0 an 27.2 il 1.2	Querenberg, n. Giessübel, Thüringerwald.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L-A., IX, p. 306, 1889.	Melaphyre.	
	or 23.9 di 15.3 ab 22.5 ol 7.2 an 17.0 mt 7.0 ne 4.5	Stengerts, Spessart, Bavaria.	H. Stuber.	E. Goller, N. J. B. B., VI, p. 566, 1889.	Kersantite.	
SO_3 0.10 Org trace	Q 6.1 di 13.2 or 23.9 hy 4.9 ab 21.0 il 1.8 an 19.2 hm 3.5 ap 1.1	Gronig, St. Wendel, Harz Mountains.	Hesse.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 266, 1892.	Diorite-porphyrite.	Not fresh.
S 0.07	Q 4.0 hy 4.2 or 27.8 mt 3.2 ab 25.2 il 2.3 an 22.5 hm 2.7 ap 1.1	Mondhalde, Kaiserstuhl, Baden.	F. Graeff.	F. Graeff, Mt. Bad. G. L-A., IV.	Mondhaldeite.	
Cl trace S trace	Q 2.0 di 1.8 or 27.8 wo 4.8 ab 27.2 mt 2.3 an 20.3 il 2.2 hm 4.0	Föhrenberg, Kaiserstuhl, Baden.	K. Gruss.	K. Gruss, Mt. Bad. G. L-A., IV, p. 97, 1900.	Mondhaldeite.	Sum low.
Cl 0.18 S 0.04	or 27.2 di 9.0 ab 23.1 ol 1.7 an 19.5 mt 5.1 ne 6.2 il 2.6 ap 1.0	Mondhalde, Kaiserstuhl, Baden.	F. Graeff.	F. Graeff, cf. N. J., 1890, II, p. 65.	Tephrite.	Border of dike. Cf. No. 83, andose.
	or 21.7 di 7.3 ab 28.8 ol 8.4 an 22.0 mt 7.4 ne 0.3 ap 3.0	Rongstock, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XV, p. 487, 1895.	Dolerite (essexite).	Alkalies and TiO_2? Cf. No 14, essexose.
	or 18.3 di 16.9 ab 25.2 ol 4.3 an 22.5 mt 8.4 ne 0.6 ap 1.7	Eichberg, n. Habendorf, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XIV, p. 112, 1894.	Leucite-tephrite.	
	or 20.0 di 11.0 ab 17.3 hy 20.3 an 25.9 ol 2.1 mt 1.4 il 2.0	Radicofani, Tuscany.	H. S. Washington.	H. S. Washington, A. J. S., IX, p. 52, 1900.	Andesite (gray)	Dried at 110°. Sum high.
	or 20.0 di 9.8 ab 18.3 hy 21.2 an 25.8 ol 1.0 mt 2.6 il 2.3	Castle Gate, Radicofani, Tuscany.	H. S. Washington.	H. S. Washington, A. J. S., IX, p. 52, 1900.	Andesite(black)	Dried at 110°. Sum high.
	Q 7.0 di 4.5 or 27.8 hy 13.0 ab 20.4 mt 3.0 an 21.1 ap 1.1	Sassara, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Ak., 1888, p. 96.	Olivine-trachyte.	Alkalies low? Also in N. J. B. B., VI, p. 7, 1889.
	Q 9.5 hy 17.1 or 25.0 mt 3.2 ab 15.2 an 26.4 C 0.9	Mont' Alfina, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Ak., 1888, p. 96.	Olivine-trachyte.	Alkalies low? Also in N. J. B. B., VI, p. 7, 1889.
SO_3 0.44 Cl trace	Q 6.7 di 13.6 or 25.0 mt 1.6 ab 30.9 ap 0.8 an 17.5	Bagnaia, n. Viterbo, Italy.	L. Ricciardi.	A. Verri, B. Soc. G. Ital., VIII, p. 403, 1889.	Trachyte.	Alkalies?
	Q 2.6 di 6.8 or 26.1 hy 7.3 ab 24.6 mt 5.8 an 25.9	Monte Santa Croce, Rocca Monfina, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 252, 1897.	Biotite-vulsinite.	Dried at 110°.
SO_3 trace	or 19.5 di 13.3 ab 25.2 ol 9.1 an 26.7 mt 4.9 ne 0.6	Tilba Tilba Lake, South Coast, New South Wales.	J. C. H. Mingaye.	W. Anderson, Rec. G. S. N. S. W., II, p. 153, 1902.	Hornblende-andesite.	
	Q 5.1 di 3.9 or 20.0 wo 7.4 ab 28.8 mt 6.5 an 22.0 hm 4.5	Port Resolution, Tanna Island, New Hebrides, Pacific Ocean.	A. Liversidge.	A. Liversidge, Jour. R. Soc. N. S. W., XX, p. 237, 1887.	Glassy lava.	Al_2O_3 and Fe_2O_3 transposed. MgO low? MnO high.

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 8.3 ab 25.7 an 23.9	di 18.1 hy 1.0 ol 7.2 mt 12.0 il 1.1	Coldbrook Marsh, St. John, New Brunswick.	W. D. Matthew.	W. D. Matthew, Tr. N. Y. Ac. Sci., XIV, p. 214, 1895.	Quartz-diabase.	
Cl F FeS_2 NiO	0.09 0.03 0.24 trace	Q 2.4 or 13.9 ab 30.9 an 21.1	di 7.4 hy 11.5 mt 5.3 il 3.9 ap 2.0	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 69, 1897.	Diorite.	
		Q 2.3 or 14.5 ab 26.7 an 23.4	di 8.1 hy 18.4 mt 2.6 il 1.7	South Leverett, Massachusetts.	L. G. Eakins.	B. K. Emerson, M. U. S. G. S., XXIX, p. 336, 1898.	Tonalite.	
		or 10.6 ab 29.3 an 25.6	di 14.2 hy 8.0 ol 5.8 mt 2.8 il 4.0	Peach's Neck, Marblehead, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 60, 1899.	Diorite.	
		or 12.8 ab 27.8 an 31.1 ne 2.8	ol 15.9 mt 5.3 ap 1.6	Medford, Massachusetts.	G. P. Merrill.	G. P. Merrill, B. G. S. A., VII, p. 353, 1896.	Diabase.	
		or 12.2 ab 34.1 an 20.3	di 14.0 hy 11.4 ol 5.3 mt 1.2	Montrose Point, Cortlandt, New York.	M. D. Munn.	J. D. Dana, A. J. S., XXII, p. 104, 1881.	Norite.	Also cf. G. H. Williams, A. J. S., XXXIII, p. 193, 1887.
		Q 3.2 or 5.6 ab 33.0 an 22.5	di 19.3 wo 2.0 mt 8.1 hm 4.2	Near Baptism River, Minnesota.	Dodge and Sidener.	M. E. Wadsworth, B. G. Nh. S. Minn., 2, p. 79, 1887.	Gabbro.	Near beerbachose.
SrO	none	Q 5.6 or 10.6 ab 27.2 an 22.5	di 11.4 hy 11.6 mt 7.4 il 2.4	Duluth, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 293, 1900.	Orthoclase-gabbro.	
SrO Li_2O	0.08 trace	Q 2.7 or 16.1 ab 37.2 an 20.0	di 5.3 hy 8.1 mt 1.2 il 2.6 ap 1.2	Big Timber Creek, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 148, p. 143, 1897.	Diorite-porphyrite.	
SrO	0.11	Q 2.5 or 8.3 ab 34.6 an 30.3	di 3.2 hy 13.0 mt 3.5 il 2.0 ap 1.2	Sweet Grass Creek, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 148, p. 143, 1897.	Quartz-diorite.	
SrO Li_2O	0.11 trace	or 11.1 ab 34.1 an 30.9	di 5.0 hy 5.3 ol 3.1 mt 4.6 il 3.1 ap 1.9	Big Timber Creek, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 148, p. 144, 1897.	Diorite.	
Li_2O	trace	or 19.5 ab 36.7 an 20.6	di 4.8 hy 14.9 mt 2.3 il 0.9	Robinson, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 90, 1896.	Diorite.	
SrO Li_2O	0.11 trace	Q 0.7 or 16.7 ab 36.2 an 27.5	di 6.2 hy 6.9 mt 2.1 il 1.4	Carpenter Creek, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 490, 1900.	Diorite.	
Cl SrO	0.07 0.08	Q 4.9 or 15.0 ab 28.3 an 25.9	di 12.0 hy 8.7 mt 1.6 il 1.2 ap 1.0	Red Mountains, n. Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899.	Diorite.	
S NiO SrO	0.02 0.02 0.07	Q 8.7 or 12.8 ab 27.2 an 23.6	di 7.9 hy 14.1 mt 1.4 il 2.0	Croesus Mine, Hailey, Idaho.	W. F. Hillebrand.	W. Lindgren, 20 A. R. U. S. G. S., III, p. 81, 1900.	Gabbro.	Near tonalose.
SO_3 Cl Li_2O	0.07 trace none	Q 8.9 or 12.8 ab 30.9 an 26.1	di 3.7 hy 9.6 mt 3.7 il 2.0	Electric Peak, Yell. Nat. Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 627, 1891.	Pyroxene-mica-diorite.	
Cl	trace	Q 5.5 or 19.5 ab 34.1 an 22.5	di 3.9 hy 7.3 mt 5.3 il 1.5	Hurricane Ridge, Crandall Basin, Yell. Nat. Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 231, 1899.	Diorite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
18	57.38	16.86	2.49	5.17	5.51	7.32	3.33	1.45	0.42			trace	trace	trace		100.70	
A2. II	.956	.165	.016	.072	.138	.131	.054	.015				—	—	—			
19	57.32	17.29	3.89	3.03	3.56	5.81	3.89	3.04	0.30	0.33		0.62	0.50	0.06		99.74	
A2. II	.955	.170	.024	.042	.089	.104	.063	.032				.008	.003	.001			
20	57.26	19.40	2.49	3.29	2.57	5.68	4.21	2.95	0.86			0.76	0.51	0.16		100.14	
A2. II	.954	.190	.016	.046	.064	.101	.068	.031				.010	.003	.002			
21	57.17	17.25	2.48	4.31	4.83	6.61	3.44	2.03	1.20			1.03	0.05	none		100.40	
A2. II	.953	.169	.015	.060	.121	.118	.055	.022				.013	—	—			
22	56.47	15.33	2.54	4.53	5.08	6.93	3.81	1.66	1.65			0.99	0.54	0.18		99.71	
A2. II	.941	.150	.015	.062	.127	.123	.061	.018				.012	.004	.003			
23	56.21	18.24	3.26	3.69	3.38	5.91	4.15	3.02	0.78			0.88	0.64	0.17		100.33	
A2. II	.937	.179	.020	.051	.085	.106	.067	.032				.011	.004	.002			
24	55.93	18.32	2.39	4.91	3.97	6.17	4.29	2.62	0.22			0.81	0.56	0.14		100.33	
A2. II	.932	.180	.015	.068	.099	.110	.069	.028				.010	.004	.002			
25	55.92	17.70	3.16	4.48	4.34	5.90	4.08	2.24	1.42			0.94	0.18	trace		100.45	
A1. I	.932	.174	.020	.062	.109	.105	.066	.025				.012	.001				
26	53.89	18.81	4.92	2.81	3.29	5.42	3.65	2.98	2.99			0.49	0.52	0.17		99.94	
A2. II	.898	.184	.031	.039	.082	.097	.059	.032				.006	.004	.002			
27	53.75	20.75	4.50	3.53	3.76	7.18	4.16	1.37	1.55		none	none	0.15	trace		100.70	
A2. II	.896	.203	.028	.049	.094	.128	.067	.015				—	.001	—			
28	53.71	18.00	3.99	4.05	5.19	6.88	3.50	3.10	0.55			0.74	0.38	0.24		100.33	
A2. II	.895	.176	.025	.056	.130	.123	.056	.033				.009	.003	.003			
29	53.57	17.78	3.19	4.93	4.36	6.22	4.04	3.04	0.80	0.27	none	0.89	0.44	0.07	0.21	99.94	
A1. I	.893	.174	.020	.068	.109	.110	.064	.032				.011	.003	.001	.002		
30	52.37	16.57	6.34	2.35	5.27	8.54	2.99	2.45	1.04	1.18		0.73	0.31	0.07		100.33	
A2. II	.873	.162	.039	.033	.132	.152	.048	.026				.009	.002	.001			
31	52.18	18.19	3.31	4.38	4.69	6.51	4.58	1.88	2.00	0.75	none	0.99	0.29	0.14	0.11	100.04	
A1. I	.870	.178	.021	.061	.117	.116	.074	.020				.012	.002	.002	.001		
32	52.09	17.84	4.27	4.56	5.33	8.03	3.39	1.98	1.77			0.39	0.27	0.14		100.06	
A2. II	.868	.175	.027	.061	.144	.143	.055	.021				.005	.002	.002			
33	51.70	17.90	7.24	1.00	2.77	6.94	4.17	1.62	1.15			3.17	0.41	trace		100.23	
A1. I	.862	.175	.045	.014	.069	.124	.068	.017				.039	.003	—			
34	50.99	15.62	8.47	1.43	5.23	6.53	3.39	3.05	2.48	1.39		0.67	0.53	trace		99.85	
A2. II	.850	.153	.053	.019	.131	.116	.055	.032				.008	.003	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 Cl Li_2O	0.21 0.17 0.39	Q 7.3 or 8.3 ab 28.3 an 26.7	di 7.9 hy 17.3 mt 3.7	Electric Peak, Yell. Nat. Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 627, 1891.	Pyroxene-porphyrite.	Li_2O high.
NiO	0.10	Q 7.1 or 17.8 ab 33.0 an 21.0	di 3.8 hy 8.4 mt 5.6 il 1.2 ap 1.1	Hurricane Ridge, Crandall Basin, Yell. Nat. Park.	W. H. Melville.	J. P. Iddings, M. U. S. G. S., XXXII, p. 261, 1899.	Monzonite.	
		Q 2.0 or 21.7 ab 35.6 an 23.1	di 2.1 hy 8.0 mt 3.7 il 1.5 ap 1.1	Hurricane Ridge, Crandall Basin, Yell. Nat. Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 261, 1899.	Diorite.	Facies of gabbro.
SO_3 Cl Li_2O	trace trace trace	Q 7.6 or 12.2 ab 28.8 an 25.6	di 5.9 hy 13.6 mt 3.5 il 1.8	Sepulchre Mountain, Yell. Nat. Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 648, 1891.	Pyroxene-andesite.	
		Q 6.8 or 10.0 ab 32.0 an 22.5	di 6.8 hy 14.0 mt 3.5 il 1.8 ap 1.2	Near Dunraven Peak, Yell. Nat. Park.	F. A. Gooch.	J. P. Iddings, B. U. S. G. S., 148, p. 135, 1897.	Pyroxene-andesite.	
		Q 3.8 or 17.8 ab 35.1 an 22.5	di 3.0 hy 9.7 mt 4.6 il 1.7 ap 1.3	Hurricane Ridge, Crandall Basin, Yell. Nat. Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 260, 1899.	Orthoclase-gabbro-diorite.	
		Q 1.6 or 15.6 ab 36.2 an 23.1	di 3.5 hy 13.9 mt 3.5 il 1.5 ap 1.3	Hurricane Ridge, Crandall Basin, Yell. Nat. Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 260, 1899.	Orthoclase-gabbro-diorite.	
SO_3 Cl Li_2O	trace none 0.09	Q 3.5 or 13.9 ab 34.6 an 23.1	di 5.0 hy 12.0 mt 4.6 il 1.7	Sepulchre Mountain, Yell. Nat. Park.	J. E. Whitfield.	J. P. Iddings, 12 A. R. U. S. G. S., I, p. 648, 1891.	Hornblende-andesite.	
		Q 4.9 or 17.8 ab 30.9 an 25.9	hy 8.4 mt 1.4 il 4.8 ap 1.2	Indian Peak, Crandall Basin, Yell. Nat. Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 260, 1899.	Basalt-glass.	In breccia.
SO_3 Cl Li_2O	trace none trace	Q 2.4 or 8.3 ab 35.1 an 33.6	di 1.6 hy 11.4 mt 6.5	Mount Washburn, Yell. Nat. Park.	J. E. Whitfield.	J. P. Iddings, B. U. S. G. S, 148, p. 136, 1897.	Basalt.	
		or 18.3 ab 29.3 an 24.2	di 8.0 hy 12.0 mt 7.2	Hurricane Ridge, Crandall Basin, Yell. Nat. Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 260, 1899.	Mica-gabbro.	
Cr_2O_3 NiO SrO Li_2O	none none 0.13 trace	or 17.8 ab 33.5 an 21.7	di 7.0 hy 8.6 ol 2.7 mt 4.6 il 1.7	Beam's Hill, Sunlight Valley, Yell. Nat. Park.	H. N. Stokes.	Hague and Jaggar, B. U. S. G. S., 168, p. 95, 1900.	Gabbro.	
NiO	0.12	Q 3.4 or 14.5 ab 25.2 an 24.5	di 13.9 hy 6.8 mt 5.6 il 1.4 hm 2.4	Stinkingwater Canyon, Yell. Nat. Park.	W. H. Melville.	J. P. Iddings, B. U. S. G. S., 148, p. 135, 1897.	Basalt.	
Cl S NiO SrO Li_2O	trace none trace 0.06 trace	or 11.1 ab 38.8 an 23.4	di 7.2 hy 3.8 ol 5.8 mt 4.9 il 1.8	Shoshone Canyon, Yell. Nat. Park.	W. F. Hillebrand.	Hague and Jaggar, B. U. S. G. S., 168, p. 96, 1900.	Diabase.	
		or 11.7 ab 28.8 an 27.5	di 10.0 hy 11.0 ol 3.7 mt 6.3 il 0.8	Timber Creek, Crandall Basin, Yell. Nat. Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 260, 1899.	Basalt.	
SO_3 Li_2O Iron	0.32 0.03 1.81	Q 5.0 or 9.5 ab 35.6 an 27.8	hy 6.9 il 2.2 hm 7.2 pf 3.5 ir 1.8	Yellowstone Canyon, Yell. Nat. Park.	J. E. Whitfield.	J. P. Iddings, B. U. S. G. S., 148, p. 135, 1897.	Basalt.	Contains metallic iron; derived from mortar?
NiO	0.07	Q 1.2 or 18.3 ab 28.8 an 18.1	di 8.8 hy 9.0 mt 2.6 il 1.2 hm 6.7 ap 1.1	Stinkingwater Canyon, Yell. Nat. Park.	W. H. Melville.	J. P. Iddings, M. U. S. G. S., XXXII, p. 340, 1899.	Hornblende-basalt?	Near shoshonose.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
35	56.19	16.12	4.92	4.43	4.60	7.00	2.96	2.37	1.03				0.27	trace		99.91	2.742
A3. III	.937	.158	.031	.061	.115	.125	.048	.025					.002	—			
36	56.62	16.74	4.94	3.27	4.08	7.39	3.50	1.97	0.92		1.15		trace	0.15		100.73	
A3. III	.944	.164	.030	.046	.102	.132	.056	.021					—	.002			
37	57.42	18.48	3.74	2.10	1.71	6.84	4.52	3.71	0.28	0.08	none	0.86	0.36	0.09	0.15	100.45	2.767
A1. I	.957	.181	.023	.030	.043	.122	.072	.039				.011	.003	.001	.002		26°
38	55.65	17.04	2.81	5.17	3.42	6.82	3.27	2.29	1.49	0.46		0.90	0.37	0.20	0.08	100.02	2.783
A1. I	.928	.167	.017	.072	.086	.121	.053	.024				.011	.003	.003	.001		22°
39	52.97	18.31	1.86	6.73	3.04	6.51	3.74	3.35	0.31	0.44		1.04	0.81	0.09	0.18	99.57	
A1. I	.883	.179	.012	.093	.076	.116	.060	.035				.013	.006	.001	.001		
40	47.32	16.71	6.92	5.94	5.69	8.51	2.70	2.02	1.04	0.24	none	1.50	0.96	0.08	0.07	99.95	2.949
A1. I	.789	.164	.043	.082	.142	.151	.043	.021				.019	.007	.001	.001		26.5°
41	48.76	15.89	6.04	4.56	5.98	8.15	3.43	2.93	1.48	0.40		1.65	0.60	0.13	0.17	100.23	
A1. I	.813	.155	.037	.063	.150	.145	.055	.031				.021	.004	.002	.001		
42	52.38	18.79	2.88	4.90	4.91	7.70	3.99	1.76	0.53			1.22	0.56	0.18	0.11	99.91	
A1. I	.873	.174	.018	.068	.123	.137	.064	.019				.015	.004	.003	.001		
43	52.37	17.01	1.44	5.89	6.86	7.59	3.51	1.59	1.29		0.37	1.60		0.32	0.06	99.90	
A2. II	.873	.167	.009	.082	.172	.135	.056	.017				.020		.002	—		
44	52.27	17.68	2.51	5.00	6.05	8.39	4.19	1.58	0.82		trace	1.49		0.23	0.06	100.27	
A2. II	.871	.173	.015	.070	.151	.150	.068	.017				.018		.003	—		
45	51.57	17.72	6.24	1.78	4.91	8.82	3.59	1.99	0.64		0.58	1.43		0.45	0.16	99.88	
A2. II	.860	.174	.039	.025	.123	.157	.058	.021				.017		.006	.001		
46	56.63	16.81	3.62	3.44	4.23	7.53	3.08	2.24	0.51	0.80	none	0.67	0.16	0.23	0.09	100.14	
A1. I	.944	.165	.023	.048	.106	.134	.050	.024				.008	.001	.003	.001		
47	56.07	19.06	5.39	0.92	2.12	7.70	4.52	1.24	0.99	—		1.24	0.16	0.23		99.64	
A2. II	.935	.187	.034	.011	.053	.138	.073	.013				.015	.001	.003			
48	56.03	18.31	3.47	4.42	3.64	7.43	3.60	1.18	0.31	0.12	none	1.24	0.13	0.11	trace	99.99	
A1. I	.934	.180	.022	.061	.091	.133	.058	.013				.015	.001	.002	—		
49	51.54	20.31	4.65	3.56	3.16	9.55	4.29	2.47	0.34	—		0.32	0.57	0.32		101.07	
B2. III	.859	.199	.029	.049	.079	.171	.069	.026				.004	.004	.005			
50	52.99	16.71	3.80	3.55	6.95	8.49	3.56	1.29	0.59	0.18	none	1.18	0.42	trace	0.07	99.92	
A1. I	.883	.164	.024	.050	.174	.151	.057	.014				.015	.003	—	.001		
51	57.37	15.66	2.06	4.46	8.84	4.94	3.05	1.51	0.61	0.12		0.60	0.02	0.27		99.92	2.830
2. II	.956	.153	.013	.062	.221	.088	.049	.016				.007	—	.004			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl	0.02	Q 8.6 or 13.9 ab 25.2 an 23.6	di 9.0 hy 11.2 mt 7.2	Buffalo Peaks, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 1, p. 26, 1883.	Hypersthene-andesite.	Also in A. J. S., XXV, p. 142, 1883, near tonalose.
SrO	trace	Q 8.1 or 11.7 ab 29.4 an 24.2	di 9.9 hy 8.3 mt 7.0	Buckskin Gulch, Leadville region, Colorado.	W. F. Hillebrand.	W. Cross, 14 A. R. U. S. G. S., II, p. 227, 1894.	Hornblende-porphyrite.	
SO_3 Cl SrO Li_2O	none 0.03 0.08 trace	Q 4.0 or 21.7 ab 37.7 an 20.0	di 8.7 mt 5.3 il 1.5 ap 1.0	Babcock Peak, La Plata Mountains, Colorado.	H. N. Stokes.	W. Cross, B. U. S. G. S., 168, p. 162, 1900.	Monzonite.	
SO_3 NiO SrO Li_2O	none none 0.05 trace	Q 8.1 or 13.8 ab 27.8 an 25.0	di 4.8 hy 12.0 mt 3.9 il 1.7 ap 1.0	Black Face, Telluride, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 163, 1900.	Lamprophyre, allied to camptonite.	
ZrO_2 SrO	0.05 0.14	or 19.5 ab 31.4 an 23.4	di 3.2 hy 12.0 ol 2.4 mt 2.8 il 1.8 ap 1.8	Saddle Mountain, Pike's Peak, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 148, p. 163, 1897.	Basalt.	
SO_3 Cl SrO Li_2O	0.19 trace 0.06 trace	Q 0.7 or 11.7 ab 22.5 an 27.8	di 6.8 hy 13.7 mt 10.0 il 3.0 ap 2.2	Mount Sneffels, Telluride, Colorado.	H. N. Stokes.	W. Cross, B. U. S. G. S., 168, p. 163, 1900.	Gabbro-porphyry.	Near camptonose.
ZrO_2 SrO Li_2O	none 0.06 none	or 17.2 ab 26.7 an 19.2 ne 1.1	di 14.1 ol 6.5 mt 8.6 il 3.1 ap 1.3	Saddle Mountain, Pike's Peak, Colorado.	W. F. Hillebrand.	W. Cross, J. G. V., p. 689, 1897.	Basalt.	
		or 10.6 ab 33.5 an 28.1	di 5.4 hy 12.3 ol 1.6 mt 4.2 il 2.3 ap 1.3	Rio Grande Canyon, New Mexico.	L. G. Eakins.	J. P. Iddings, A. J. S., XXXVI, p. 220, 1888.	Basalt.	
Cl	trace	or 9.5 ab 29.3 an 26.1	di 9.3 hy 15.6 ol 3.0 mt 2.1 il 3.1	Rio Grande Canyon, New Mexico.	L. G. Eakins.	J. P. Iddings, A. J. S., XXXVI, p. 220, 1890.	Quartz-basalt.	Also in B. U. S. G. S., 66, p. 30, 890.
Cl	trace	or 8.5 ab 35.6 an 24.5	di 13.9 ol 9.4 mt 3.5 il 2.8	Rio Grande Canyon, New Mexico.	L. G. Eakins.	J. P. Iddings, A. J. S., XXXVI, p. 220, 1888.	Quartz-basalt.	Also in B. U. S. G. S., 66, p. 30, 1890.
		Q 0.7 or 11.7 ab 30.4 an 26.4	di 13.4 hy 6.1 mt 1.9 il 2.6 hm 5.0	Rio Grande Canyon, New Mexico.	L. G. Eakins.	J. P. Iddings, A. J. S., XXXVI, p. 220, 1888.	Quartz-basalt.	Also in B. U. S. G. S., 66, p. 30, 1890.
FeS_2 V_2O_3 NiO SrO Li_2O	0.06 0.04 trace? trace trace	Q 9.1 or 13.3 ab 26.2 an 25.3	di 9.1 hy 8.4 mt 5.3 il 1.2	Delarof Harbor, Unga Island, Alaska.	W. F. Hillebrand.	G. F. Becker, 18 A. R. U. S. G. S., III, p. 55, 1898.	Augite-bronzite-andesite.	Complete in B. U. S. G. S., 168, p. 226, 1900.
		Q 7.6 or 7.2 ab 38.3 an 28.1	di 9.0 hy 1.6 il 2.2 hm 5.4	Bogoslof Island, Alaska.	T. M. Chatard.	G. P. Merrill, Proc. U. S. Nat. Mus., VIII, p. 33, 1885.	Hornblende-andesite.	Dried at 110°.
S SrO Li_2O	trace trace trace	Q 9.1 or 7.2 ab 30.4 an 30.3	di 5.3 hy 9.7 mt 5.1 il 2.3	Kalinai Pass, Aleutian Peninsula, Alaska.	H. N. Stokes.	J. E. Spurr, A. G., XXV, p. 233, 1900.	Augite-aleutite.	
		or 14.5 ab 30.4 an 28.9 ne 3.1	di 11.4 ol 3.6 mt 6.7 il 0.6 ap 1.4	Bogoslof Island, Alaska.	T. M. Chatard.	G. P. Merrill, Proc. U. S. Nat. Mus., VIII, p. 33, 1885.	Hornblende-andesite.	Dried at 110°. Sum high.
SO_3 Cl S Cr_2O_3 NiO SrO	none trace none none 0.02 0.12	Q 2.2 or 7.8 ab 29.9 an 25.9	di 11.1 hy 13.7 mt 6.6 il 2.3 ap 1.0	Red Cone, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, B. U. S. G. S., 168, p. 223, 1900.	Basalt.	
NiO	0.41	Q 7.6 or 8.9 ab 25.7 an 24.5	hy 27.6 mt 3.0 il 1.1	Burns Valley, California.	W. H. Melville.	G. F. Becker, M. U. S. G. S., XIII, p. 159, 1888.	Basalt.	Near tonalose.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
52	57.25	16.45	1.67	4.72	6.74	7.65	3.00	1.57	0.40	—		0.60	0.20	0.10	none	100.35	
A1. I	.954	.161	.010	.065	.169	.136	.048	.017				.007	.001	.001	—		
53	56.70	15.75	1.29	5.32	7.16	7.67	3.36	1.56	0.30	—		0.65	0.20	0.19	0.03	100.18	
A1. I	.945	.154	.008	.074	.179	.137	.054	.018				.008	.001	.003	—		
54	56.53	17.50	1.35	5.03	5.94	8.07	3.51	1.55	0.27	—		0.54	0.15	0.12	trace	100.56	
A1. I	.942	.171	.009	.070	.149	.144	.056	.017				.007	.001	.002	—		
55	56.18	16.59	1.51	5.51	7.26	7.64	3.58	1.47	0.42	—						100.16	
A3. III	.936	.162	.009	.076	.182	.136	.058	.016									
56	55.93	17.34	1.50	5.20	7.29	8.04	3.32	1.35	0.26	—						100.23	
A3. III	.932	.170	.009	.072	.182	.143	.053	.015									
57	57.59	16.49	1.22	4.89	7.72	7.40	3.62	0.99	0.86	—						100.78	
A3. III	.960	.161	.007	.068	.193	.132	.058	.011									
58	57.11	17.78	3.54	2.74	3.41	7.21	3.81	1.86	0.98	—		0.95	0.26	0.33	0.03	100.01	
A1. I	.952	.174	.022	.038	.085	.128	.061	0.20				.012	.002	.005	—		
59	52.63	17.62	6.49	3.10	5.64	8.62	3.38	1.73	0.79	—		0.07	0.47	trace	0.04	100.58	
A1. I	.877	.173	.040	.043	.141	.153	0.55	0.19				.001	.003	—	—		
60	55.20	18.68	3.14	4.42	4.59	8.02	3.66	1.01	0.51			0.92	0.24	0.14	0.03	100.58	
A1. I	.920	.183	.020	.061	.115	.143	.059	.011				.012	.002	.002	—		
61	55.86	19.30	0.91	4.78	2.94	7.31	3.52	1.52	1.23	0.19	none	1.20	0.38	0.16	0.13	99.86	
A1. I	.931	.189	.006	.067	.074	.130	.056	.016				.015	.003	.002	.001		
62	55.18	17.35	2.77	3.90	4.80	7.98	3.42	1.42	1.52	0.16	none	0.83	0.20	0.15	0.04	100.09	
A1. I	.920	.170	.017	.054	.120	.143	.055	.015				.010	.001	.002	—		
63	55.40	15.32	2.70	5.49	5.75	9.90	2.89	1.52	0.38	0.03		0.60	0.22	0.11	0.07	100.38	
A1. I	.923	.150	.017	.076	.144	.177	.047	.016				.008	.002	.002	.001		
64	50.56	14.71	3.54	8.90	4.07	7.58	2.94	2.10	1.12	1.06		1.71	1.14	0.13	0.25	99.81	
A1. I	.843	.144	.022	.122	.102	.135	.047	.022				.022	.008	.002	.002		
65	51.89	15.28	3.10	3.60	8.68	7.38	3.27	2.57	1.37	1.17	none	0.91	0.61	0.12	0.15	100.21	
A1. I	.865	.150	.020	.050	.217	.132	.053	.027				.011	.004	.002	.001		
66	56.40	15.99	3.26	3.82	3.54	6.98	3.83	1.91	2.47			1.14	0.32	0.12		99.78	
A2. II	.940	.157	.020	.053	.089	.125	.062	.020				.013	.002	.002			
67	51.98	17.20	8.22	2.00	5.41	8.17	3.84	0.90	0.62			0.36	0.99			99.69	2.72
A2. II	.866	.169	.051	.028	.185	.146	.062	0.10				.004	.007				
68	54.36	14.27	6.28	3.04	5.87	7.50	3.35	2.22	1.21	—	trace	0.30	0.33	1.19	0.02	100.04	
A1. I	.906	.140	.039	.042	.147	.134	.054	.023				.004	.002	.017	—		

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO Li_2O	trace none	Q 6.9 or 9.5 ab 25.2 an 26.7	di 9.0 hy 18.9 mt 2.3 il 1.1	Cinder Cone, Snag Lake, California.	W. F. Hillebrand.	J. S. Diller, A. J. S., XXXIII, p. 49, 1887.	Quartz-basalt.	Dried at 110°. Also in B. U. S. G. S., 79, p. 29, 1891.
Cr_2O_3 SrO Li_2O	trace trace trace	Q 3.2 or 10.0 ab 28.3 an 22.8	di 12.3 hy 19.6 mt 1.9 il 1.2	Cinder Cone, Snag Lake, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 79, p. 29, 1891.	Quartz-basalt.	Dried at 110°. Volcanic bomb.
Cr_2O_3 SrO Li_2O	trace? trace? trace	Q 3.4 or 9.5 ab 29.3 an 27.2	di 10.4 hy 17.0 mt 2.1 il 1.1	Cinder Cone, Snag Lake, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 79, p. 29, 1891.	Quartz-basalt.	Dried at 110°. Lapilli.
		Q 1.1 or 8.9 ab 30.4 an 24.5	di 10.8 hy 21 9 mt 2.1	Lake Bidwell, Cinder Cone, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 79, p. 29, 1891.	Quartz-basalt.	Dried at 110°.
		Q 2.0 or 8.3 ab 27.8 an 28.4	di 9.3 hy 22.2 mt 2.1	Cinder Cone, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 79, p. 29, 1891.	Quartz-basalt.	Dried at 110°.
		Q 4.1 or 6.1 ab 30.4 an 25.4	di 9.0 hy 23.0 mt 1.6	Silver Lake, Lassen Peak, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 79, p. 29, 1891.	Quartz-basalt.	Dried at 110°.
SrO	trace	Q 9.4 or 11.1 ab 32.0 an 25.9	di 7.7 hy 5.4 mt 5.1 il 1.8	Mill Creek, Shasta County, California.	T. M. Chatard.	J. S. Diller, B. U. S. G. S., 148, p. 196, 1897.	Hypersthene-andesite.	Dried at 110°. Near tonalose.
SO_3 SrO Li_2O	trace trace trace	Q 2.5 or 10.6 ab 28.8 an 27.5	di 10.9 hy 9.4 mt 9.3 ap 1.1	Burney Butte, Shasta County, California.	R. B. Riggs.	J. S. Diller, B. U. S. G. S., 148, p. 200, 1897.	Basalt.	Dried at 110°.
SrO Li_2O	0.02 none	Q 5.9 or 6.1 ab 30.9 an 31.4	di 6.8 hy 12.1 mt 4.6 il 1.8	Bidwell's Road, Butte County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 196, 1897.	Hypersthene-andesite.	Dried at 110°.
FeS_2 NiO SrO Li_2O	0.39 trace 0.04 trace	Q 7.9 or 8.9 ab 29.3 an 32.5	di 3.2 hy 12.2 mt 1.4 il 2.2	Tuolumne River, Amador County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 702, 1896.	Diorite.	
FeS_2 NiO SrO Li_2O	0.28 0.03 0.06 trace	Q 6.6 or 8.3 ab 28.8 an 27.8	di 9.8 hy 10.8 mt 3.9 il 1.5	Tuolumne River, Amador County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 702, 1896.	Diorite-porphyry.	
SrO Li_2O	none trace	Q 5.1 or 8.9 ab 24.6 an 24.2	di 20.5 hy 11.4 mt 3.9 il 1.1	Near Emigrant Gap, Placer County, California.	W. F. Hillebrand.	W. Lindgren, B. U. S. G. S., 148, p. 212, 1897.	Gabbro.	Near camptonose.
SrO Li_2O	trace? trace?	Q 3.7 or 12.2 ab 24.6 an 20.9	di 8.3 hy 16.5 mt 5.1 il 3.5 ap 2.5	Near Mount Ingalls, Plumas County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 491, 1894.	Basalt.	Near camptonose.
ZrO_2 NiO SrO Li_2O	trace 0.02 0.09 trace	or 15.0 ab 27.8 an 22.2	di 9.0 hy 7.9 ol 7.2 mt 4.6 il 1.7 ap 1.2	San Joaquin River, Madera County, California.	W. F. Hillebrand.	H. W. Turner, B. U. S. G. S., 168, p. 218, 1900.	Basalt.	
		Q 8.3 or 11.1 ab 32.5 an 20.9	di 11.1 hy 6.2 mt 4.6 il 2.0	Sutro Tunnel, Washoe, Nevada.	G. E. Moore.	G. F. Becker, M. U. S. G. S., III, p. 152, 1882.	Pyroxene-andesite.	Also in Hague and Iddings, B. U. S. G. S., 17, p. 33, 1885.
		Q 4.8 or 5.6 ab 32.5 an 27.0	di 5.4 hy 11.0 mt 6.6 hm 3.7 ap 2.4	Cerro de Guadelupe, Puebla, Mexico.	A. Röhrig.	A. Hoppe, in Felix and Lenk, Btr. G. Mex., II, p. 211, 1899.	Basalt.	Near beerbachose.
ZrO_2 Cl FeS_2 CoO Cu Pb	trace 0.02 0.02 none 0.06 none	Q 6.0 or 12.8 ab 28.3 an 17.5	di 15.3 hy 7.6 mt 9.0 il 0.6	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. contrib.	Diorite-gneiss.	Dried at 110°.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
69	52.19	15.47	8.30	3.65	4.59	8.26	2.77	1.48	0.90	——	0.15	1.24	0.10	0.13	0.08	99.70	
A1. I	.870	.151	.052	.051	.115	.147	.061	.016				.015	.001	.002	.001		
70	56.91	18.18	4.65	3.61	3.49	7.11	4.02	1.61	0.36				0.25			100.19	
A3. III	.949	.178	.029	.050	.087	.127	.064	.017					.002				
71	56.89	19.72	4.06	3.65	1.91	5.87	5.14	1.96	0.62	——		trace	trace			99.82	
A3. III	.948	.193	.025	.051	.048	.105	.083	.021				——	——				
72	50.97	15.56	4.43	7.62	4.28	7.05	5.04	1.26	1.58			1.98	0.43	0.38		100.74	2.919
A2. II	.850	.153	.027	.106	.107	.126	.081	.014				.024	.003	.005			
73	56.09	16.03	3.12	4.77	8.03	6.73	3.49	1.87	0.16			0.37				100.66	2.892
A3. III	.935	.157	.020	.062	.201	.120	.056	.020				.005					
74	48.06	16.95	4.78	7.60	5.51	7.79	3.37	1.42	0.80			2.57	0.63	trace		99.48	
A2. II	.801	.166	.030	.106	.138	.139	.054	.015				.031	.004				
75	53.29	18.87	4.09	4.53	2.47	5.71	4.07	3.66	2.66							99.35	2.765
B3. IV	.888	.185	.026	.062	.062	.102	.066	.039									
76	50.30	18.67	6.06	4.27	4.66	9.37	4.05	1.42	n. d.			1.84				100.64	
A3. III	.838	.183	.038	.060	.117	.168	.066	.015				.023					
77	55.05	16.26	3.83	3.31	5.34	7.61	3.37	1.49	1.93			1.01	0.20			99.53	2.796
A2. II	.918	.159	.024	.046	.134	.135	.055	.016				.013	.001				
78	53.58	15.84	2.98	4.90	7.16	7.86	2.99	1.63	2.54			0.98	0.19			100.75	2.760
A2. II	.893	.155	.019	.068	.179	.140	.048	0.17				.012	.001				
79	53.31	20.05	2.18	3.37	3.33	8.65	4.17	1.30	2.02		0.06	1.16	0.18			99.98	2.746
A2. II	.889	.196	.014	.048	.083	.154	.068	.014				.014	.001				
80	51.65	13.41	8.45	2.79	3.60	8.17	3.90	1.58	0.14		trace	3.37	1.07			99.41	
B2. III	.861	.131	.053	.039	.090	.146	.063	.017				042	.008				
81	50.74	15.89	7.88	1.75	4.59	8.97	3.27	1.30	3.25		0.14	1.37	0.44			99.72	2.742
A2. II	.846	.154	.050	.025	.115	.160	.053	.013				.017	.003				
82	54.13	16.17	3.36	4.76	6.76	7.48	2.89	1.63	2.72			trace	0.19			100.25	2.625
A2. II	.902	.158	.021	.066	.169	.134	.047	.017				——	.001				
83	51.53	18.28	4.89	2.11	1.69	5.10	4.74	3.01	6.90			1.33	0.46	0.18		100.29	2.554
A2. II	.859	.179	.031	.030	.042	.091	.076	.032				.016	.003	.002			
84 '	50.45	18.90	7.73	2.61	5.41	9.00	3.92	1.05	0.10	0.18		0.27	0.52			100.14	
A2. II	.841	.185	.049	.036	.135	.160	.063	.012				.003	.004				
85	54.70	18.05	3.63	3.31	3.90	6.36	4.08	1.97	3.28			1.09	trace			100.50	2.684
A2. II	.912	.177	.022	.046	.098	.113	.066	.021				.013	——				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 Cl FeS_2 CoO Cu	none 0.13 0.26 none trace	Q 4.3 or 8.9 ab 32.0 an 20.6	di 15.8 hy 4.2 mt 8.4 il 2.3 hm 2.6	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. contrib.	Proterobase.	Dried at 110°.
		Q 7.9 or 9.5 ab 33.5 an 27.0	di 6.8 hy 8.2 mt 6.7	Purgatorio, Pasto Volcano, Colombia.	R. Küch.	R. Küch, G. Stud. Colomb., I, p. 139, 1892.	Pyroxene-andesite.	
SO_3 Cl Li_2O Ag	trace trace trace trace	Q 3.4 or 11.7 ab 43.5 an 24.7	di 3.7 hy 6.5 mt 5.8	Eruption of July 22, 1885, Cotopaxi, Ecuador.	J. W. Mallet.	J. W. Mallet, Pr. R. Soc., XLII, 2, 1887.	Andesite.	Ashes.
S	0.16	or 7.6 ab 41.9 an 16.1 ne 0.3	di 13.2 ol 8.5 mt 6.3 il 3.7 ap 1.0	Cord. de Dona Ana, Coquimbo, Chile.	F. Soenderop.	F. v. Wolff, Z. D. G. G., LI, p. 529, 1899.	Augite-kersantite.	Near akerose.
		Q 2.5 or 11.1 ab 29.3 an 22.5	di 8.8 hy 20.7 mt 4.6 il 0.8	Campo Maior, Alemtejo, Portugal.	A. Merian.	A. Merian, N. J. B. B., III, p. 296, 1885.	Mica-diorite.	
		or 8.3 ab 28.3 an 26.9	di 6.6 hy 12.5 ol 2.9 mt 7.0 il 4.8 ap 1.4	Hovland, Laugendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 75, 1899.	Bronzite-kersantite.	
		or 21.7 ab 31.6 an 22.2	di 5.1 hy 3.5 ol 3.8 mt 5.8	Barnabas Bridge, Murbach, Vogesen.	A. Denniger.	A. Osann, Abh. G. Sp. K. Els. L, III, p. 123, 1887.	Labradorite porphyry.	Sum low. Near shoshonose.
		or 6.3 ab 33.5 an 28.4 ne 0.6	di 14.2 ol 3.6 mt 8.8 il 3.4	Ernensbach, Vogesen.	Löscher.	W. Deecke, Z. D. G. G., XLIII, p. 873, 1891.	Diabase.	
SO_3 Org	0.05 0.08	Q 7.7 or 8.9 ab 28.8 an 24.5	di 10.5 hy 9.4 mt 5.6 il 2.0	Martinstein, Nahethal, Rh. Prussia.	Jacobs.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 309, 1892.	Bronzite-tholeiite.	SO_3 for S.
SO_3	0.16	Q 3.4 or 9.5 ab 25.2 an 25.0	di 11.0 hy 17.5 mt 4.4 il 1.8	Mettweiler, Nahethal, Rh. Prussia.	A. Hesse.	A. Leppla, Erl. G. Sp. K. Pr., XLVI, p. 35, 1894.	Melaphyr.	SO_3 for S.
SO_3	0.20	Q 1.6 or 7.8 ab 35.6 an 31.7	di 9.0 hy 6.7 mt 3.2 il 2.2	Sattel, Niederkirchen, Nahethal, Rh. Prussia.	Gremse.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 309, 1892.	Dolerite.	SO_3 for S.
SO_3	1.28	Q 7.3 or 9.5 ab 33.0 an 14.2	di 14.7 hy 2.1 il 6.2 hm 8.5 ap 2.6	Staufenberg, Wesergebiet, Rh. Prussia.	P. Jannasch.	F. Rinne, Jb. Pr. G. L-A., XIII, p. 79*, 1893.	Basalt.	TiO_2 high? Sum low. SO_3 for S.
SO_3	0.13	Q 5.8 or 7.2 ab 27.8 an 24.5	di 13.4 hy 5.3 mt 1.9 il 2.6 hm 6.8 ap 1.0	Tiefert, Nahethal, Rh. Prussia.	Bärwald.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 309, 1892.	Labradorite-porphyry.	SO_3 for S.
SO_3	0.16	Q 4.6 or 9.5 ab 24.6 an 26.1	di 9.0 hy 18.6 mt 4.9	Eulenbis, Pfalz.	H. Haefcke.	A. Leppla, Jb. Pr. G. L-A., XIV, p. 146, 1894.	Melaphyr.	SO_3 for S.
S	0.07	Q 1.0 or 17.8 ab 39.8 an 19.7	di 2.2 hy 3.2 mt 3.2 il 2.5 hm 2.7 ap 1.1	Mondhalde, Kaiserstuhl, Baden.	F. Graeff.	F. Graeff, cf. N. J., 1890, II, p. 65.	Tephrite.	Center of dike. Cf. No. 39, shoshonose.
		or 6.7 ab 33.0 an 30.6	di 8.0 hy 9.7 mt 7.7 il 0.5 hm 2.5 ap 1.3	Lichtenberg, Odenwald, Hesse.	Not stated.	C. Chelius, cf. N. J., 1894, II, p. 419.	Diorite.	
SO_3	0.13	Q 4.7 or 11.7 ab 34.6 an 25.0	di 5.4 hy 8.6 mt 5.1 il 2.0	Herchweiler, St. Wendel, Harz Mountains.	Fischer.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 316, 1892.	(Porphyrite.) No name.	SO_3 for S.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
86	54.19	16.28	5.08	3.46	2.98	6.34	4.05	1.98	3.67		0.07	1.56	0.43			100.23	2.656
A2. II	.903	.160	.032	.049	.075	.113	.065	.021				.019	.003				
87	55.54	15.64	1.19	7.13	4.84	5.67	3.17	2.28	2.93		0.40	1.24	0.45			100.87	2.798
A2. II	.926	.153	.007	.099	.121	.101	.051	.024				.015	.003				
88	52.34	19.90	6.57	0.55	2.26	6.35	5.66	2.68	3.65	0.41		0.14	0.09			100.62	2.623
A2. II	.872	.195	.041	.008	.057	.113	.091	.029				.002	.001				
89	44.85	18.08	7.71	3.23	4.16	9.97	3.19	2.82	2.56	0.46		1.78	1.55			100.36	2.839
A2. II	.748	.177	.048	.045	.104	.178	.051	.030				.022	.011				
90	58.20	19.20	2.01	4.42	3.25	5.60	4.53	1.81	1.28			0.21	0.33			100.84	
B2. III	.970	.188	.013	.061	.081	.100	.073	.020				.003	.002				
91	46.76	17.93	5.33	5.62	7.31	8.24	3.53	2.20	1.83		1.33	trace		trace		100.08	
A3. III	.779	.175	.033	.078	.183	.147	.056	.023				—		—			
92	58.00	18.87	4.81	1.01	3.84	7.92	3.50	2.40	0.60							100.95	2.96
B3. IV	.967	.185	.030	.014	.096	.141	.056	.025									
93	56.82	16.68	3.84	4.57	3.93	6.36	3.39	2.81	1.48				trace			99.88	2.657
A3. III	.947	.163	.024	.064	.098	.113	.055	.030					—				22°
94	49.24	19.06	1.77	10.33	5.00	8.75	3.89	1.19	0.63							99.86	
A3. III	.821	.186	.011	.143	.125	.156	.063	.013									
95	52.20	14.67	1.83	11.51	3.48	6.69	3.04	2.49	0.11	—		2.55	0.83	trace		100.23	
A2. II	.870	.144	.011	.160	.087	.120	.049	.026				.032	.006	—			
96	53.17	13.62	5.42	5.96	3.84	8.67	2.95	2.40	3.56					trace		99.59	
A3. III	.886	.133	.034	.083	.096	.155	.048	.025									
97	52.27	16.07	2.25	14.48	1.68	6.67	3.29	1.50	2.05							100.26	
A3. III	.871	.157	.014	.201	.042	.120	.053	.016									
98	53.61	16.11	3.05	4.45	6.80	7.00	3.95	3.08	1.65			0.34		0.14		100.18	2.75
A2. II	.894	.158	.019	.062	.170	.125	.064	.033				.004		.002			15°
99	55.87	18.74	4.88	5.01	1.39	8.20	3.43	1.55	0.36			0.01				99.45	2.769
B3. IV	.925	.183	.031	.069	.034	.146	.055	.017				—					
100	45.40	17.00	9.97	3.27	5.07	10.72	3.28	1.09	0.16			2.90	1.27	0.40		100.53	
A2. II	.757	.167	.062	.046	.127	.191	.053	.012				.035	.009	.006			
101	48.71	18.87	3.18	8.00	4.85	9.87	4.15	1.52	none			1.81	trace	trace		100.96	2.99
B2. III	.812	.185	.020	.111	.121	.177	.067	.016				.023	—	—			
102	45.61	15.98	8.25	11.60	3.75	6.42	3.50	1.82	0.27			1.15	0.72	1.20		100.27	2.94
A2. II	.760	.156	.052	.161	.094	.114	.056	.020				.014	.005	.017			
103	47.63	17.20	3.60	8.09	6.25	6.42	4.65	1.31	2.71	—	0.44	1.39	trace			100.22	2.893
A2. II	.794	.169	.029	.112	.156	.114	.075	.014				.017	—				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3	0.14	Q 8.0 or 11.7 ab 34.1 an 20.6	di 6.5 hy 4.5 mt 7.4 il 2.9 ap 1.0	Idarthal, St. Wendel, Harz Mountains.	Bärwald.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 316, 1892.	Basalt.	SO_3 for S.
SO_3 Org	0.33 0.06	Q 6.4 or 13.3 ab 26.7 an 22.2	di 2.5 hy 21.0 mt 1.6 il 2.3 ap 1.1	Lampersdorf, Silesia.	W. Hampe.	E. Dathe, Jb. Pr. G. L-A., VII, p. 331, 1887.	Quartz-augite-diorite.	SO_3 for S.
SO_3	0.02	or 16.1 ab 36.7 an 20.9 ne 6.0	di 8.2 ol 1.4 mt 1.9 hm 5.3	Birkigt, Dobrankathal, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XIV, p. 108, 1894.	Nosean-leucite-tephrite.	Iron oxides? SO_3 low.
		or 16.7 ab 20.4 an 26.7 ne 3.4	di 9.7 ol 4.2 mt 5.3 il 3.4 hm 4.0 ap 3.7	Birkigt, Dobrankathal, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XIV, p. 109, 1894.	Nephelite-tephrite.	Iron oxides? Near shoshonose.
		Q 5.3 or 11.1 ab 38.3 an 26.3	di 1.1 hy 13.8 mt 3.0	Pöllagraben, Salzkammergut, Tyrol.	C. v. John.	C. v. John, Jb. G. R-A., Wien, XLIX, p. 250, 1899.	Tonalite.	
		or 12.8 ab 19.4 an 26.7 ne 5.4	di 11.4 ol 13.5 mt 7.7	Dorfestein, Fürstenfeld, Styria.	R. v. Zeynek.	A. Sigmund, T. M. P. M., XVII, p. 534, 1898.	Magmabasalt.	Not fresh.
		Q 8.4 or 13.9 ab 29.3 an 28.9	di 8.0 hy 5.9 mt 3.2 hm 2.6	Val Ufirn, St. Gotthard, Switzerland.	Grubenmann and Anderwert.	U. Grubenmann, Mt. Thurg. Nf. Ges., X, p. 20, 1892.	Diorite.	
Cl	trace	Q 6.5 or 16.7 ab 28.8 an 21.7	di 7.9 hy 11.2 mt 5.6	Mte. Scopa, Capraia Island, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 141, 1893.	Andesite.	
		or 7.2 ab 26.2 an 30.6 ne 3.7	di 10.7 ol 18.3 mt 2.6	Ferdinandea Island, Mediterranean.	H. Foerstner.	H. Foerstner, T. M. P. M., XV, p. 391, 1883.	Basalt.	
Cl S	0.08 0.23	Q 2.8 or 14.5 ab 25.7 an 19.2	di 7.3 hy 20.6 mt 2.6 il 4.8 ap 1.9	Goroschki, Wolhynia, Russia.	W. Tarassenko.	W. Tarassenko, cf. N. J., 1899, I, p. 463.	Gabbro-syenite.	Dried at 120°. Near camptonose.
		Q 5.3 or 13.9 ab 25.2 an 16.7	di 21.7 hy 5.5 mt 7.9	Jalguba, Olonez, Russia.	Loewinson-Lessing.	Loewinson-Lessing, T. M. P. M., VI, p. 294, 1885.	Variolite.	Near camptonose.
		Q 1.2 or 8.9 ab 27.8 an 24.5	di 7.7 hy 24.9 mt 3.2	Caucasus Mountains.	Loewinson-Lessing and Krikmeyer.	Loewinson-Lessing, cf. N. J., 1899, II, p. 234.	Albite-diorite.	FeO and MgO? Near camptonose.
		or 18.3 ab 32.0 an 17.0 ne 0.9	di 14.6 ol 11.1 mt 4.7	Persufli, Thessaly, Greece.	R. Lepsius.	R. Lepsius, Geol. v. Attika, Berlin, 1893, p. 169.	Basalt.	
Cl	trace	Q 8.6 or 9.5 ab 28.8 an 30.9	di 8.2 hy 6.9 mt 7.2	Mount Oros, Ægina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Augite-hypersthene-andesite.	
		or 6.7 ab 27.8 an 28.4	di 12.8 hy 2.2 ol 3.2 mt 2.6 il 5.4 hm 8.2 ap 3.0	Punta Delgada, Azores.	C. v. John?	C. v. John, Jb. G. R-A., Wien, XLVI, p. 290, 1896.	Basalt.	
		or 8.9 ab 22.5 an 28.4 ne 6.8	di 17.2 ol 9.3 mt 4.6 il 3.4	Crater walls, Kilauea, Hawaii.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 187, 1888.	Basalt.	Sum high.
		or 11.1 ab 29.3 an 22.4	di 4.0 hy 3.7 ol 13.7 mt 12.1 il 2.2 ap 1.7	Crater walls, Kilauea, Hawaii.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 173, 1888.	Basalt.	Near camptonose.
FeS_2	0.53	or 7.8 ab 31.4 an 22.2 ne 4.3	di 7.7 ol 14.9 mt 6.7 il 2.6	Navigation Creek, Noyang, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XX, p. 53, 1884.	Diorite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	46.91	16.67	11.46	5.57	3.61	6.06	3.86	0.78	n. d.			3.23	1.08	trace		99.23	
B2. III	.783	.163	.072	.078	.090	.108	.062	.008				.039	.008	—			
2	49.64	15.07	1.66	8.82	5.43	7.23	4.19	0.89	2.81	0.45	0.32	2.32	0.29	0.25	0.02	100.27	
A1. I	.827	.148	.010	.122	.136	.128	.068	.009				.028	.002	.004	—		
3	46.47	16.28	3.15	8.96	6.56	7.90	3.64	0.21	3.89	0.28	1.26	1.28	0.13	0.09	none	100.11	
A1. I	.775	.160	.020	.125	.164	.141	.059	.002				.016	.001	.001	—		
4	56.60	17.84	2.55	4.09	3.16	6.28	4.45	0.45	3.20			1.59	0.14	trace	none	100.35	2.39
A2. II	.943	.175	.016	.057	.079	.114	.072	.005				.020	.001	—	—		
5	57.47	18.86	2.21	4.08	4.27	7.42	3.85	0.73	0.22			0.75	0.24	0.10	0.03	100.34	
A1. I	.958	.185	.014	.057	.107	.132	.062	.008				.009	.002	.001	—		
6	55.08	18.93	2.02	5.56	5.17	8.40	4.23	0.74	0.29			trace				100.42	
A3. III	.918	.185	.013	.077	.129	.150	.068	.008				—					
7	57.87	16.30	1.71	3.86	5.50	5.53	5.01	0.75	2.40	0.26		0.53	0.27	0.08	0.05	100.12	
A1. I	.964	.161	.010	.054	.138	.099	.080	.008				.007	.002	.001	—		
8	52.82	16.39	2.31	10.92	3.43	7.87	4.83	0.92	0.48					trace		99.97	
A3. III	.880	.160	.014	.151	.086	.141	.077	.010						—			
9	52.16	15.86	4.90	5.86	4.57	8.16	3.67	0.88	2.28		1.38	0.32	0.24			100.54	2.764
A2. II	.869	.155	.030	.081	.114	.145	.059	.009				.004	.002				
10	52.35	17.90	9.38	2.02	1.90	8.45	4.97	0.76	1.17	—			0.45	trace		99.35	
B2. III	.873	.175	.059	.028	.048	.151	.080	.008					.003	—			
11	47.78	20.51	2.54	6.07	4.62	10.65	4.69	0.51	0.54	0.10		0.26	0.49			100.07	
A2. II	.796	.201	.015	.085	.116	.190	.076	.005				.003	.003				
12	51.70	19.39	2.54	6.44	4.64	8.95	4.07	0.83	0.92	0.15		0.14	0.37			100.68	
A2. II	.862	.190	.015	.089	.116	.160	.066	.009				.002	.003				
13	47.21	20.52	7.48	5.32	4.16	8.63	5.17	0.33	0.34	0.10			0.46			99.91	
A2. II	.787	.201	.047	.074	.104	.153	.084	.003					.003				
14	47.20	16.60	7.80	6.40	5.69	7.20	4.74	0.55	1.29			1.80	0.18			99.54	
A2. II	.787	.163	.049	.089	.142	.128	.076	.006				.022	.001				
15	53.86	16.44	8.02	1.96	5.44	8.53	4.52	0.07	1.27				0.15			100.30	2.894
A3. III	.864	.161	.050	.028	.136	.151	.072	.001					.001				22°
16	48.00	15.80	11.76	3.29	7.70	5.51	3.42	0.46	4.20				trace	trace		100.14	3.158
A3. III	.800	.155	.073	.046	.193	.098	.055	.005					—	—			15°
17	51.18	17.44	4.70	4.15	2.87	9.60	5.84	0.44	1.46			2.40	0.79	0.10		100.97	
B2. III	.853	.171	.029	.058	.072	.171	.094	.004				.030	.006	.001			
18	49.01	16.29	7.61	4.89	3.62	9.79	3.82	0.80	—			3.93	0.49	0.27		100.84	
B1. II	.817	.160	.048	.068	.091	.175	.061	.008				.047	.003	.004			
19	46.30	17.95	6.21	6.79	3.67	8.17	3.92	0.89	—			5.35	0.53	0.26		100.32	
A1. I	.772	.177	.039	.094	.092	.146	.063	.009				.065	.004	.004			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 5. PERSODIC. BEERBACHOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Q 6.5 or 4.4 ab 32.5 an 22.8 C 1.1	hy 9.0 mt 9.0 il 6.0 hm 5.3 ap 2.6	Nain, Labrador.	A. Wichmann.	A. Wichmann, Z. D. G. G., XXXVI, p. 494, 1884.	Mica-porphyrite.	
ZrO_2 FeS_2 Cr_2O_3 V_2O_3 NiO SrO	none 0.79 trace 0.04 trace 0.05	or 5.0 ab 35.6 an 19.7	di 13.0 hy 6.0 ol 9.0 mt 2.3 il 4.3	Aroostook Falls, Aroostook County, Maine.	W. F. Hillebrand.	H. E. Gregory, B. U. S. G. S., 165, p. 176, 1900.	Diabase.	Not fresh.
SO_3 F Cr_2O_3 SrO Li_2O CuO	none trace 0.01 none trace trace	or 1.1 ab 30.9 an 27.5	di 9.5 hy 4.6 ol 13.9 mt 4.6 il 2.4	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, M. U. S. G. S., XXXVI, p. 103, 1899.	Metabasalt.	Not fresh. Near hessose. Nearly in salfemane.
SrO	none	Q 8.9 or 2.8 ab 37.7 an 27.2	di 3.4 hy 11.5 mt 3.7 il 3.1	Little Saganaga Lake, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 352, 1900.	Quartz-gabbro.	Near placerose. Sp. gr. low.
SrO	0.11	Q 9.6 or 4.4 ab 32.5 an 32.0	di 3.9 hy 12.3 mt 3.2 il 1.4	Near Crater Lake, Oregon.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 231, 1897.	Basalt.	Near hessose. Near placerose.
		Q 0.6 or 4.4 ab 35.6 an 30.3	di 9.2 hy 16.9 mt 3.0	Delta, Shasta County, California.	W. H. Melville.	J. S. Diller, B. U. S. G. S., 148, p. 190, 1897.	Andesite-basalt.	
SrO Li_2O	trace trace	Q 5.0 or 4.4 ab 41.9 an 20.3	di 5.9 hy 16.5 mt 2.3 il 1.1	South Husent Creek, Butte County, California.	W. F. Hillebrand.	H. W. Turner, J. G., III, p. 403, 1895.	Diorite.	Also in 17 A. R. U. S. G. S., I, p. 731, 1896.
		or 5.6 ab 40.3 an 20.3	di 16.0 ol 13.9 mt 3.2	Wiborg, Finland.	H. Berghell.	H. Berghell, Finl. G. Und., 33, p. 26, 1898.	Diabase.	
SO_3 Org	0.21 0.05	Q 4.1 or 5.0 ab 30.9 an 24.2	di 13.2 hy 11.3 mt 7.0 il 0.6	Kyrburg, Nahethal, Rh. Prussia.	Bärwald.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 309, 1892.	Basalt.	SO_3 for S.
		Q 3.5 or 4.4 ab 41.9 an 24.2	di 10.4 hy 1.9 mt 6.5 hm 5.0	Near Grube Horn, Siebengebirge, Rh. Prussia.	Not stated.	E. Kaiser, Vh. Nh. Ver. Bonn, LIV, p. 176, 1897.	Andesite.	Iron oxides? Sum low.
FeS_2	0.31	or 2.8 ab 25.2 an 33.3 ne 8.0	di 13.4 ol 10.2 mt 3.6 ap 1.1	Wallbach, Hesse.	W. Sonne.	C. Chelius, Notbl. Ver. Erdk., XVIII, p. 24, 1897.	Olivine-gabbro.	
		or 5.0 ab 34.6 an 32.0	di 10.2 hy 4.5 ol 8.7 mt 3.5	Ernsthofen, Odenwald, Hesse.	W. Sonne.	C. Chelius, Notbl. Ver. Erdk., XVIII, p. 15, 1897.	Luciite-porphyrite.	Cf. H. Rosenbusch, Elemente, p. 228, 1900.
FeS_2	0.19	or 1.7 ab 35.1 an 31.7 ne 4.8	di 6.0 ol 7.9 mt 10.8 ap 1.1	Frankenstein, Odenwald, Hesse.	R. Marzahn.	Chelius and Klemm, Erl. G. Kt. Hessen, X, p. 39, 1896.	Beerbachite.	
S	0.09	or 3.3 ab 36.2 an 22.5 ne 2.0	di 10.3 ol 8.9 mt 11.4 il 3.4	Auermahdsattel, Salzkammergut, Tyrol.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLIX, p. 256, 1899.	Diabase-porphyrite.	
Cl	0.04	Q 3.1 or 0.6 ab 37.7 an 24.5	di 13.7 hy 7.3 mt 6.5 hm 3.5	Punta di Zenobito, Capraia Island, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 143, 1893.	Anamesite.	Iron oxides?
S	trace	Q 3.2 or 2.8 ab 28.8 an 26.4	di 0.7 hy 19.0 mt 10.7 hm 4.3	Kypriano, Laurion, Greece.	R. Lepsius.	R. Lepsius, Geol. V. Attika, Berlin, 1893, p. 101.	Hornblende-gabbro.	Not fresh.
		or 2.2 ab 45.1 an 20.3 ne 2.2	di 16.3 mt 6.7 il 4.5 ap 1.9	Porto Grande, St. Vincente, Cape Verde Islands.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLVI, p. 287, 1896.	Diorite.	Sum high.
SO_3 S CuO	0.20 0.02 0.10	Q 2.5 or 4.4 ab 32.0 an 25.0	di 18.4 hy 0.6 mt 4.9 il 7.2 hm 4.3	Mount Kohala, Hawaii.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Ignited. $H_2O+=1.00$. $H_2O-=0.98$.
SO_3 S CuO	0.06 0.05 0.17	Q 0.3 or 5.0 ab 33.0 an 28.9	di 6.3 hy 6.3 mt 6.7 il 10.0 hm 1.6 ap 1.2	Waianae, Oahu, Hawaii.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Ignited. $H_2O+=2.00$. $H_2O-=1.75$.

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	48.75	17.97	0.41	13.62	3.39	8.82	1.63	2.40	0.60		trace	0.99	0.68	0.91		100.17	2.985
A2. II	.813	.176	.003	.189	.085	.157	.026	.025				.012	.005	.013			
2	48.80	20.50	4.20	6.35	8.65	8.15	1.52	1.40	1.00							100.57	
A3. III	.813	.201	.026	.089	.216	.145	.024	.015									
3	48.10	20.10	3.71	6.45	7.61	9.45	2.10	2.50	1.20							101.27	
C3. V	.802	.197	.023	.090	.190	.169	.034	.026									

RANG 4. DOCALCIC. HESSASE.

1	52.60	18.45	2.47	6.11	4.22	7.55	3.24	1.12	2.53			1.11	0.20	0.23		99.83	
A2. II	.877	.181	.015	.085	.106	.135	.052	.011				.013	.001	.003			
2	43.73	20.17	4.32	6.93	3.91	10.99	2.42	1.45	1.02	0.08		4.23	0.15	trace		99.40	3.058
B2. III	.729	.198	.027	.097	.098	.196	.039	.015				.053	.001				11°
3	56.94	20.82	0.83	3.02	2.36	9.41	3.36	1.58	0.59	0.21	0.45	0.44	0.07	0.11	0.05	100.24	
A1. I	.949	.204	.005	.042	.059	.168	.054	.017				.005	.001	.002	—		
4	53.18	23.25	1.53	1.82	2.60	11.18	3.97	0.86	0.98	0.15	0.34	0.45	0.09	0.11	trace?	100.51	
A2. II	.886	.228	.009	.025	.065	.200	.064	.009				.006	.001	.002	—		
5	47.88	18.90	1.39	10.45	7.10	8.36	2.75	0.81	0.43	0.18	0.12	1.20	0.20	0.16	trace	100.02	
A1. I	.798	.185	.009	.145	.178	.149	.044	.008				.015	.001	.002	—		
6	43.42	22.37	0.81	9.25	5.75	13.34	1.24	1.13	1.54	0.09		1.25	0.10	0.06		100.35	
A2. II	.724	.219	.005	.129	.144	.238	.020	.012				.016	.001	.001			
7	51.52	19.77	0.47	6.77	6.49	8.16	2.66	0.70	1.68			1.39	0.10			99.71	2.832
A2. II	.859	.194	.003	.094	.162	.146	.043	.007				.017	.001				
8	44.92	18.88	2.73	13.76	5.38	9.07	2.94	0.53	1.62	0.20				0.26		100.29	
A3. III	.749	.185	.017	.191	.135	.161	.047	.005						.004			
9	49.80	19.96	6.32	0.49	7.05	11.33	2.22	0.61	1.71	0.13	0.15	0.79	0.07			100.63	
A2. II	.830	.195	.039	.007	.176	.201	.035	.006				.010	.001				
10	49.88	18.55	2.06	8.37	5.77	9.72	2.59	0.68	1.04	—		1.19	0.16	0.09	0.02	100.12	2.923
A1. I	.831	.182	.013	.117	.144	.173	.042	.007				.015	.001	.001	—		
11	48.29	20.87	1.13	4.93	7.54	14.32	1.77	0.38	0.89							100.12	
A3. III	.805	.204	.007	.068	.189	.255	.029	.004									
12	46.45	21.30	0.81	9.57	7.90	9.83	2.14	0.34	1.02	0.14		1.19	0.02	trace		100.75	
A2. II	.774	.209	.005	.134	.195	.175	.034	.003				.015	—	—			
13	47.90	19.92	4.92	9.78	4.55	8.56	2.75	0.56	0.76			0.57			none	100.39	2.93
A2. II	.798	.195	.031	.137	.114	.152	.044	.006				.007			—		

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 2. SODIPOTASSIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
S	trace	or 13.9 ab 13.6 an 43.1	di 0.5 hy 15.6 ol 11.7 mt 0.7 il 1.8	Pine Hill, Medford, Massachusetts.	R. C. Sweetser.	W. H. Hobbs, B. M. C. Z., XVI, p. 9, 1888.	Diabase.	
		Q 0.6 or 8.3 ab 12.6 an 40.3 C 1.7	hy 30.0 mt 6.0	Vallée de Valbonne, Pyrenees Mts., France.	A. Pisani.	A. Lacroix, B. S. C. G. Fr., XI, No. 71, p. 31, 1900.	Mica-diorite.	Al_2O_3 high?
		or 14.5 ab 16.8 an 38.1 ne 0.6	di 7.3 ol 17.6 mt 5.3	Vallée de Valbonne, Pyrenees Mts., France.	A. Pisani.	A. Lacroix, B. S. C. G. Fr., XI, No. 71, p. 31, 1900.	Mica-diorite.	Al_2O_3 high? Sum high.

SUBRANG 3. PRESODIC. HESSOSE.

		Q 5.0 or 6.1 ab 27.2 an 32.8	di 3.9 hy 16.2 mt 3.5 il 2.0	East Clarendon, Vermont.	H. N. Stokes.	C. L. Whittle, B. U. S. G. S., 148, p. 71, 1897.	Hornblende-granite.	Not described.
		or 8.3 ab 17.8 an 40.0 ne 1.4	di 11.9 ol 4.6 mt 6.3 il 8.2	Nahant, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 63, 1899.	Gabbro.	Sum low.
S Cr_2O_3 NiO SrO Li_2O	trace trace trace trace trace	Q 7.9 or 9.5 ab 28.3 an 37.0	di 8.1 hy 6.2 mt 1.2 il 0.8	Elizabethtown, Essex County, New York.	W. F. Hillebrand.	J. F. Kemp B. U. S. G. S., 168, p. 37, 1900.	Pyroxenic anorthosite.	
S	trace	Q 1.0 or 5.0 ab 33.5 an 43.1	di 10.1 hy 3.1 mt 2.1 il 0.9	Whiteface Mountain, Adirondacks, New York.	G. Steiger.	J. F. Kemp, B. U. S. G. S., 168, p. 36, 1900.	Gabbro.	
S Cr_2O_3 V_2O_3 NiO SrO	0.07 trace trace 0.02 trace	or 4.4 ab 23.1 an 37.0	di 3.6 hy 10.7 ol 15.6 mt 2.1 il 2.3	Split Rock Mine, Westport, Essex County, New York.	W. F. Hillebrand.	J. F. Kemp, 19 A. R. U.S.G.S., III, p. 402, 1899.	Gabbro.	
Cr_2O_3 Li_2O	trace trace	or 6.7 ab 5.2 an 52.0 ne 2.8	di 11.7 ol 16.3 mt 1.2 il 2.5	Ilchester, Howard County, Maryland.	W. F. Hillebrand.	G. H. Williams, 15 A. R. U. S. G. S., p. 673, 1895.	Gabbro-diorite.	Near corsase.
		Q 2.0 or 3.9 ab 22.5 an 40.0	di 0.5 hy 25.7 mt 0.7 il 2.6	Sudbury, Ontario.	Not stated.	T. L. Walker, Q. J. G. S., LIII, p. 56, 1897.	Diabase.	
		or 2.8 ab 21.0 an 37.0 ne 2.0	di 6.6 ol 24.8 mt 3.9	Ottertail Creek, Nipissing district, Ontario.	F. G. Wait.	G. C. Hoffman, A. R. G. S. Can., IX, p. 20 R, 1898.	Diorite-gneiss.	
		Q 3.2 or 3.3 ab 18.3 an 42.8	di 10.1 hy 13.2 tn 0.6 il 1.1 hm 6.3	Crystal Falls, Michigan.	G. Steiger.	J. M. Clements, J. G., VI, p. 381, 1898.	Hornblende-gabbro.	Also in M. U. S. G.S., XXXVI, p. 242, 1899.
Cl SrO	trace trace	or 3.9 ab 22.0 an 37.0	di 8.9 hy 21.8 mt 3.0 il 2.3	Pigeon Point, Minnesota.	W. F. Hillebrand.	W. S. Bayley, A. J. S., XXXVII, p. 61, 1889.	Olivine-gabbro.	Dried at 105°. Also in B. U. S. G. S., 109, p. 37, 1893.
		or 2.2 ab 15.2 an 47.5	di 19.3 hy 3.1 ol 10.3 mt 1.6	Minnesota Falls, Yellow Medicine County, Minnesota.	A. N. Stokes.	W. S. Bayley, B. U. S. G. S., 150, p. 372, 1898.	Gabbro-gneiss.	
NiO	0.04	or 1.7 ab 17.8 an 47.8	di 0.8 hy 11.1 ol 16.8 mt 1.2 il 2.3	Sec. 35, T. 61 N., R. 12 W., St. Louis County, Minnesota.	H. N. Stokes.	W. S. Bayley, J. G., I, p. 712, 1893.	Gabbro.	
SrO	none	or 3.3 ab 23.1 an 40.0	di 2.0 hy 19.8 ol 1.8 mt 7.2 il 1.1	Birch Lake, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 374, 1900.	Diabase.	Incorrect on p. 184, loc. cit.

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
14	47.70	19.04	0.87	8.84	8.65	8.96	2.53	0.53	1.38			1.80		trace	none	100.30	2.89
A2. II	.795	.186	.006	.123	.216	.160	.040	.005				.022		—	—		
15	48.49	18.35	7.63	1.21	6.72	10.40	3.02	0.57	0.67			2.19	0.20			99.99	
A2. II	.808	.180	.048	.015	.168	.185	.048	.006				.026	.001				
16	52.05	17.96	4.09	6.33	5.03	8.64	2.99	1.61	0.97	—			0.31	0.43		100.41	2.891
A3. III	.868	.176	.025	.088	.126	.154	.048	.017					.002	.006			13.5°
17	50.23	19.46	4.21	4.20	3.59	10.39	3.08	1.32	1.01	0.16	0.25	1.30	0.41	0.07	0.04	99.74	
A1. I	.837	.191	.026	.058	.090	.185	.050	.014				.016	.003	.001	—		
18	51.98	15.99	3.10	5.88	5.09	9.68	2.71	0.81	2.08	0.48		1.71	0.31	0.10	0.03	99.96	
A1. I	.867	.157	.019	.082	.127	.173	.043	.009				.021	.002	.001	—		
19	48.58	20.23	1.26	3.02	7.59	14.01	2.25	0.19	2.68	0.28		0.09	trace	trace	none	100.25	
A1. I	.810	.198	.008	.042	.190	.250	.036	.002				.001	—		—		
20	55.14	19.10	6.16	0.54	4.23	8.36	3.71	1.04	0.91	—		0.52	0.18	0.11	trace	100.07	
A1. I	.919	.187	.039	.007	.106	.150	.059	.011				.007	.001	.002	—		
21	53.85	18.53	1.96	5.30	5.88	9.66	2.98	0.74	0.45	—		0.50	0.05	0.12	0.03	100.09	
A1. I	.898	.181	.012	.074	.147	.172	.048	.008				.006	—	.002	—		
22	53.35	19.22	3.28	4.48	4.86	9.76	2.89	0.99	0.77	—		0.56	0.10	0.15	trace?	100.44	
A1. I	.889	.188	.020	.076	.122	.174	.047	.011				.007	.001	.002	—		
23	52.95	18.25	4.36	4.19	4.93	8.73	3.57	0.77	1.47	—		0.66	trace	0.12	0.01	100.01	
A1. I	.883	179	.027	.058	.123	.155	.058	.008				.008	—	.002	—		
24	47.94	18.90	2.21	8.59	8.21	9.86	2.81	0.29	0.74	0.39		0.57	0.15	trace	none	100.66	
A1. I	.799	.185	.014	.120	.205	.176	.045	.003				.007	.001	—	—		
25	56.88	18.25	2.35	4.45	4.07	7.53	3.29	1.42	0.50	0.24		0.45	0.30	0.18	0.11	100.06	
A1. I	.948	.179	.015	.062	.102	.134	.053	.015				.006	.002	.003	.001		
26	55.53	17.63	2.81	3.59	5.85	8.74	3.09	0.92	1.24	—		0.56	0.21	0.08	0.02	100.33	
A1. I	.926	.173	.017	050	.146	.158	.050	.010				.007	.002	.001	—		
27	53.91	17.95	2.21	4.80	5.52	10.40	2.90	1.34	0.20	0.20		0.52	0.21	0.10	0.05	100.31	
A1. I	.899	.176	.014	.067	.138	.185	.047	.015				.006	.002	.001	—		
28	52.81	16.60	2.66	6.13	6.12	10.14	2.79	1.05	0.54	0.38		0.84	0.23		0.03	100.32	
A1. I	.880	.163	017	.085	.153	.181	.045	.011				.010	.002		—		
29	51.21	17.59	4.71	4.42	7.12	10.36	2.49	0.91	1.07	0.58		0.31	0.09	trace	none	100.86	
A1. I	.854	.172	.029	.061	.178	.185	.040	.010				.004	.001	—	—		
30	48.76	16.60	5.60	5.01	6.93	8.79	2.47	0.66	2.19	1.49	0.42	1.26	0.19		0.10	100.37	2.78
A1. I	.813	.163	.035	.070	.183	.157	.040	.007				.016	.001		.001		

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. PRESODIC. HESSOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO	none	or 2.8 ab 21.0 an 39.2	di 4.5 hy 12.7 ol 13.9 mt 1.4 il 3.4	Birch Lake, Minnesota.	H. N. Stokes.	A. N. Winchell, A. G., XXVI, p. 181, 1900.	Olivine-gabbro.	
SO_3 Li_2O	0.52 0.02	Q 0.3 or 3.3 ab 25.2 an 35.0	di 10.4 hy 12.0 tn 2.2 il 2.3 hm 7.6	Prospect Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G. S., XXXII, II, p. 438, 1899.	Basalt.	Same as No. 31 auvergnose, calc. to 100% after deducting iron.
		Q 0.9 or 9.5 ab 25.2 an 33.4	di 7.8 hy 17.0 mt 5.8	Stony Mountain, Ouray County, Colorado.	L. G. Eakins.	W. Cross, B. U. S. G. S., 148, p. 180, 1897.	Augite-diorite.	Not described.
S SrO Li_2O	0.02 trace trace	Q 2.6 or 7.8 ab 26.2 an 35.3	di 11.0 hy 6.1 mt 6.0 il 2.5 ap 1.0	Yentna River, Alaska.	H. N. Stokes.	J. E. Spurr, A. G., XXV, p. 233, 1900.	Augite-belugite.	
S Cr_2O_3 NiO SrO Li_2O	0.01 none none none trace	Q 6.5 or 5.0 ab 22.5 an 29.2	di 15.2 hy 10.9 mt 4.4 il 3.2	Camas Land, Kittitas County, Washington.	H. N. Stokes.	G. O. Smith, B. U. S. G. S., 168, p. 225, 1900.	Olivine-diabase.	
S NiO SrO Li_2O	0.10 none none none	or 1.1 ab 18.9 an 44.5	di 19.5 hy 3.1 ol 7.6 mt 2.0	Beverley Creek, Kittitas County, Washington.	H. N. Stokes.	G. O. Smith, B. U. S. G. S., 168, p. 225, 1900.	Gabbro.	
SrO Li_2O	0.07 trace	Q 7.6 or 6.1 ab 30.9 an 32.5	di 7.2 hy 7.4 il 1.1 hm 6.2	Lassen Peak, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 150, p. 218, 1898.	Secretion in dacite.	Dried at 100°. Near andose. Secretion in No. 40, lassenose.
Cr_2O_3 SrO Li_2O	trace 0.04 trace	Q 3.6 or 4.4 ab 25.2 an 34.8	di 10.6 hy 16.9 mt 2.8 il 0.9	Crater Peak, n. Lassen Peak, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 197, 1897.	Hypersthene-andesite.	Dried at 110°. Secretion in No. 46, tonalose.
SrO Li_2O	0.03 trace	Q 4.0 or 6.1 ab 24.6 an 36.1	di 9.9 hy 13.8 mt 4.6 il 1.1	Chaos, Lassen Peak, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 194, 1897.	Secretion in dacite.	Dried at 110°. Secretion in No. 39, lassenose.
SO_3 SrO	trace trace	Q 4.4 or 4.4 ab 30.4 an 31.4	di 9.3 hy 10.9 mt 6.3 il 1.2	Crater Peak, Shasta County, California.	R. B. Riggs.	J. S. Diller, B. U. S. G. S., 148, p. 200, 1897.	Basalt.	Dried at 110°.
SrO Li_2O	none trace	or 1.7 ab 23.6 an 38.1	di 8.9 hy 5.9 ol 17.0 mt 3.2 il 1.1	McCloud River, Mount Shasta, California.	H. N. Stokes.	J. S. Diller, B. U. S. G. S., 148, p. 190, 1897.	Basalt.	Not described.
SrO Li_2O	0.04 trace	Q 9.1 or 8.3 ab 27.8 an 30.9	di 5.3 hy 13.2 mt 3.5 il 0.8	Franklin Hill, Plumas County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 731, 1896.	Hypersthene-andesite.	Near bandose.
SrO Li_2O	0.06 none	Q 7.4 or 5.6 ab 26.2 an 31.4	di 9.9 hy 13.3 mt 3.9 il 1.1	Butte Mountain, Plumas County, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 148, p. 195, 1897.	Pyroxene-andesite.	Dried at 105°.
SrO Li_2O	trace trace	Q 2.6 or 8.3 ab 24.6 an 31.7	di 15.8 hy 12.4 mt 3.2 il 0.9	Mount Ingalls, Plumas County, California.	W. F. Hillebrand.	H. W. Turner, A. J. S., XLIV, p. 458, 1892.	Basalt.	Also in 14 A. R. U. S. G. S., II, p. 492, 1894.
SrO Li_2O	trace trace	Q 2.7 or 6.1 ab 23.6 an 29.7	di 16.7 hy 14.9 mt 3.9 il 1.5	Mount Ingalls, Plumas County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 492, 1894.	Basalt.	Near auvergnose.
Li_2O	none	Q 2.5 or 5.6 ab 21.0 an 33.9	di 14.1 hy 15.0 mt 6.7 il 0.6	Franklin Hill, Plumas County, California.	G. Steiger.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 734, 1896.	Olivine-basalt.	
		Q 3.9 or 3.9 ab 21.0 an 32.2	di 9.2 hy 16.8 mt 8.1 il 2.3	Dardanelles, Stanislaus County, California.	G. Steiger.	F. L. Ransome, B. U. S. G. S., 89, p. 58, 1898.	Basalt.	Not fresh.

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
31	47.27	20.82	1.85	4.26	6.44	13.02	2.75	0.22	1.27	0.08	none	0.92	0.74	trace	none	99.86	
A1. I	.788	.204	.012	.059	.161	.233	.044	.002				.011	.005	—	—		
32	49.56	20.09	2.32	2.02	7.01	15.62	1.63	0.34	2.25							100.84	
B3. IV	.826	.197	.014	.028	.175	.279	.026	.003									
33	50.38	19.83	6.05	2.00	5.36	10.03	2.15	1.76	1.37			none	none	0.38		100.14	
A2. II	.830	.194	.038	.028	.134	.178	.033	.019				—	—	.005			
34	52.62	21.77	2.13	3.58	5.68	10.19	2.39	0.25	0.80	—	0.04	0.40	0.01	trace		99.86	2.970
A2. II	.877	.213	.013	.050	.142	.182	.039	.003				.005	—	—			
35	52.20	16.10	3.56	5.68	6.70	8.58	2.40	0.89	0.60	—	0.01	2.60	0.37	0.22	none	99.94	
A1. I	.870	.158	.022	.079	.168	.153	.039	.009				.033	.002	.003			
36	52.00	21.61	3.01	4.06	6.53	8.80	2.81	0.18	0.35	—	0.06	0.53	0.01	0.05		100.00	3.066
A?2. II?	.867	.212	.019	.057	.163	.157	.045	.002				.007	—	.001			
37	51.37	21.79	3.60	3.38	6.30	10.36	2.42	0.06	0.50	—	0.10	0.32	trace	0.12		100.32	2.996
A?2. II?	.856	.214	.022	.048	.158	.185	.039	.001				.004	—	.002			
38	52.8	17.8	1.2	4.8	4.8	12.9	3.0	0.5	1.2			0.5				99.5	2.91
A3. III	.880	.174	.007	.067	.120	.230	.048	.005				.006					
39	53.50	22.20	3.60	2.64	2.00	9.45	4.26	0.61	1.50			0.45		0.35		100.59	2.800
A2. II	.892	.218	.022	.037	.050	.169	.069	.006				.006		.005			
40	53.30	20.99	1.66	6.34	3.96	8.51	2.46	0.93	1.12		0.32		0.10			99.69	
A3. III	.888	.205	.010	.088	.099	.151	.040	.010					.001				
41	52.60	17.32	1.72	12.04	3.25	7.73	2.62	1.49	1.16		0.14		0.15			100.22	
A3. III	.877	.170	.011	.167	.081	.137	.042	.016					.001				
42	49.70	22.10	3.17	5.95	4.97	9.31	2.32	1.75	0.75							100.02	
A3. III	.828	.217	.020	.083	.124	.166	.037	.019									
43	49.45	20.41	1.34	9.51	5.34	9.96	2.73	0.20	0.70			0.32				99.96	
A3. III	.824	.200	.008	.133	.134	.178	.043	.002				.004					
44	49.30	21.60	2.28	7.26	7.82	10.20	2.15	0.29	0.10							101.00	2.97
B3. IV	.822	.212	.014	.101	.196	.182	.035	.003									
45	51.32	17.84	4.34	6.70	4.18	9.51	3.01	1.52	1.98							100.50	
A3. III	.855	.175	.027	.092	.105	.169	.048	.016									
46	47.97	22.16	1.12	4.10	4.58	11.96	3.23	0.29	2.05	0.15		0.44	1.14			99.54	
A2. II	.800	.218	.007	.057	.115	.213	.051	.003				.005	.008				
47	45.94	21.16	2.21	7.14	7.80	10.49	3.21	1.14	1.02							100.11	2.982
A3. III	.766	.207	.014	.099	.195	.187	.052	.012									

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. PRESODIC. HESSOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
FeS$_2$ 0.20 Cr$_2$O$_3$ trace V$_2$O$_3$ 0.02 NiO none SrO trace Li$_2$O none	or 1.1 di 12.9 ab 23.1 hy 2.2 an 43.9 ol 9.0 mt 2.8 il 1.7 ap 1.7	Beaver Creek, Tuolumne County, California.	H. N. Stokes.	H. W. Turner, A. J. S., VII, p. 297, 1899.	Gabbro.	
	Q 1.1 di 24.4 or 1.7 hy 7.7 ab 13.6 mt 3.2 an 46.7	Point Sal, Santa Barbara County, California.	H. W. Fairbanks.	H. W. Fairbanks, B. Dep. G. Un. Cal., II, p. 50, 1896.	Gabbro.	Al$_2$O$_3$ high?
SO$_3$ 0.83 Li$_2$O trace	Q 3.8 di 7.7 or 10.6 hy 9.9 ab 17.3 mt 6.5 an 39.5 hm 1.6	Richmond Mountain, Eureka District, Nevada.	J. E. Whitfield.	Hague & Iddings, M. U. S. G. S., XX, 1892.	Basalt.	
S trace	Q 5.3 hy 18.1 or 1.7 mt 3.0 ab 20.4 il 0.8 an 50.3	Potaro River, British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, Rep. G. Esseq. River, 1900, p. 63.	Diabase.	Dried at 110°. Al$_2$O$_3$ high? Ti$_2$O and MgO low?
ZrO$_2$ none Cl trace FeS$_2$ 0.03 CuO trace	Q 8.0 di 9.4 or 5.6 hy 15.9 ab 20.4 mt 5.1 an 30.6 il 5.1	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. Contrib.	Diabase-gabbro.	Dried at 110°. Near marylandose.
S trace	Q 4.3 hy 20.5 or 1.1 mt 4.4 ab 23.6 il 1.1 an 43.6 C 0.8	Essequibo River, British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, Rep. G. Esseq. River, 1900, p. 63.	Diabase.	Dried at 110°. Al$_2$O$_3$ high? Ti$_2$O and MgO low?
S trace	Q 5.8 di 2.4 or 0.6 hy 17.6 ab 20.4 mt 5.1 an 48.4 il 0.6	Essequibo River, British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, Rep. G. Esseq. River, 1900, p. 64.	Diabase.	Dried at 110°. Al$_2$O$_3$ high? TiO$_2$ and MgO low?
	Q 2.2 di 24.8 or 2.8 hy 7.0 ab 25.2 mt 1.6 an 33.6 il 0.9	Druim an Eidhne, Island of Skye, Scotland.	J. H. Player.	Geikie and Teall, Q. J. G. S., L, p. 653, 1894.	Gabbro.	"Light band." One decimal.
	Q 4.2 di 5.8 or 3.3 hy 3.4 ab 36.2 mt 5.1 an 39.8 il 0.9	Carrock Fell, England.	G. Barrow.	A. Harker, Q. J. G. S., L, p. 323, 1894.	Quartz-gabbro.	
	Q 6.5 hy 20.2 or 5.6 mt 2.3 ab 21.0 an 42.0 C 0.4	Eycott Hill, Lake District, England.	J. Hughes.	Ward, Micr. Jour., 1887, p. 246ff.	Lava.	Cf. J. J. H. Teall. Br. Petr., p. 228, 1888. Al$_2$O$_3$ high?
	Q 2.6 di 5.8 or 8.9 hy 25.7 ab 22.0 mt 2.6 an 31.1	Eycott Hill, Lake District, England.	J. Hughes.	Ward, Micr. Jour., 1887, p. 246ff.	Lava.	Cf. J. J. H. Teall, Br. Petr., p. 228, 1888.
	or 10.6 di 1.1 ab 19.4 hy 15.3 an 44.8 ol 3.6 mt 4.6	Vallée de Valbonne, Pyrenees, France.	A. Pisani.	A. Lacroix, B. S. C. G. Fr., XI, No. 71, p. 31, 1900.	Mica-diorite.	
	or 1.1 di 5.3 ab 22.5 hy 18.6 an 43.1 ol 6.4 mt 1.9	Pallet, Loire Infér., France.	A. Lacroix.	A. Lacroix, B. S. C. G. Fr., XI, No. 77, p. 23, 1899.	Gabbro.	
	or 1.7 di 1.8 ab 18.3 hy 20.4 an 48.4 ol 7.0 mt 3.2	Pallet, Loire Infér., France.	A. Pisani.	A. Lacroix, B. S. C. G. Fr., XI, No. 77, p. 23, 1899.	Gabbro.	Sum high.
	Q 1.3 di 13.4 or 8.9 hy 12.4 ab 25.2 mt 6.2 an 30.9	Luciberg, Odenwald, Hesse.	F. Kutscher.	C. Chelius, Nbl. Ver. Erdk., XIII, p. 10, 1892.	Luciite.	
FeS$_2$ 0.35	or 1.7 di 5.0 ab 26.7 hy 7.7 an 45.6 ol 5.3 mt 1.6 il 0.8 ap 2.6	Oberbeerbach, Hesse.	W. Sonne.	C. Chelius, Nbl. Ver. Erdk., XVIII, p. 24, 1897.	Gabbro.	
	or 6.7 di 7.3 ab 18.9 ol 18.8 an 39.8 mt 3.2 ne 4.5	Veitenfeld, Kreuzberg, Rhöngebirge.	E. v. Seyfried.	E. v. Seyfried, cf. N. J., 1898, II, p. 61.	Basalt.	Al$_2$O$_3$ high?

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
48	49.94	18.86	1.47	7.12	5.61	8.54	2.50	1.62	2.77		0.23			0.63		99.29	2.88
B3. IV	.832	.185	.009	.099	.140	.152	.040	.017						.009			
49	49.46	19.82	5.69	5.82	1.93	10.62	3.38	0.71	0.06		0.31	1.88				99.68	
A3. III	.824	.195	.035	.080	.047	.189	.055	.008				.023					
50	49.95	19.17	4.72	6.71	5.03	9.61	3.13	0.74	0.09			0.69		trace		99.84	2.939
A3. III	.833	.188	.029	.093	.126	.171	.050	.007				.009		—			15°
51	50.56	17.67	1.04	8.79	4.77	8.25	3.23	0.93	0.19	0.20		2.43	0.34	0.25		99.21	
B1. II	.843	.173	.006	.122	.119	.147	.052	.010				.030	.002	.004			
52	49.13	18.48	0.41	11.69	5.77	7.42	3.08	1.09	0.07	0.06		1.61	0.34	0.15		99.53	
A1. I	.819	.181	.003	.162	.144	.132	.050	.012				.020	.002	.002			
53	49.05	19.84	3.46	8.62	2.51	8.95	2.92	0.53	2.34			1.96	0.21			100.44	
A2. II	.818	.194	.022	.120	.063	.160	.047	.006				.024	.002				
54	52.03	20.57	1.60	6.97	5.39	7.80	2.37	1.34	1.27	0.26						99.60	2.855
A3. III	.867	.201	.010	.097	.145	.139	.039	.014									

RANG 5. PERCALCIC. CORSASE.

1	44.04	20.01	4.22	8.61	5.01	11.68	1.24	0.15	1.90	0.11	none	2.24	0.52	0.28	none	100.42	
A1. I	.734	.196	.026	.120	.125	.209	.020	.002				.028	.003	.004	—		
2	43.41	23.15	3.72	4.39	7.65	14.27	0.82	0.22	1.53	0.18	0.10	0.39	0.02	0.08	none	100.09	
A1. I	.724	.226	.023	.061	.191	.255	.013	.002				.005	—	.001	—		
3	42.92	26.42	3.97	2.81	7.26	15.40	0.63	trace	0.80							100.21	
A3. III	.715	.259	.025	.039	.182	.272	.009	—									

CLASS II. DOSALANE.

RANG 1. PERALKALIC. LAURDALASE.

1	51.75	14.52	5.08	3.58	4.55	7.04	2.93	7.61	2.25			0.23	0.18	trace	0.30	100.14	
A1. I	.863	.142	.085	.050	.114	.126	.047	.081				.003	.001	—	.002		

RANG 1. PERALKALIC. LAURDALASE.

1	53.09	21.16	1.89	2.04	0.32	3.30	6.86	8.42	1.13	0.24	0.82	0.11	0.15	0.20	0.61	100.48	2.599
A1. I	.885	.198	.012	.028	.008	.059	.111	.089				.001	.001	.003	.004		26°
2	52.91	19.49	4.78	2.05	0.29	2.47	7.13	7.88	1.19		none	none	trace	0.44		100.25	
A1. I	.882	.191	.030	.029	.007	.045	.114	.084				—	—	.006			
3	57.63	17.53	3.46	1.18	0.22	1.35	5.80	9.16	3.22			0.23	trace	trace		99.86	
A2. II	.961	.172	.022	.016	.006	.024	.094	.098				.003	—	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. PRESODIC. HESSOSE—Continued

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 9.5 di 5.6 ab 21.0 hy 18.8 an 35.6 ol 3.2 mt 2.1	Prisednice, n. Zbirov, Bohemia.	F. Schulz.	F. Slavik, cf. N. J., 1901, I, p. 63.	Mica-diabase.	Sum low.
	Q 3.4 di 12.8 or 4.4 hy 1.4 ab 28.8 mt 8.1 an 36.7 il 4.5	Ditro, Siebenburgen, Hungary.	J. v. Szadeczky.	J. v. Szadeczky, cf. N. J., 1901, I, p. 402.	Camptonite.	Al_2O_3 high? MgO low?
	Q 0.4 di 9.2 or 3.9 hy 15.5 ab 26.2 mt 6.7 an 36.4 il 1.4	Near Ivrea, Piedmont.	M. Dittrich.	F. R. Van Horn, T. M. P. M., XVII, p. 404, 1898.	Norite.	
Cl 0.11 S 0.20 X 0.25	Q 0.4 di 8.3 or 5.6 hy 19.3 ab 27.2 mt 1.4 an 30.9 il 4.5	Goroschki, Volhynia, Russia.	W. Tarassenko.	W. Tarassenko, cf. N. J., 1899, I, p. 463.	Olivine-norite.	Sum low, due to H_2O+
Cl 0.08 S 0.15	or 6.7 di 3.1 ab 26.2 hy 11.3 an 33.1 ol 14.6 mt 0.7 il 3.1	Gaskowskaia Rudnja, Volhynia, Russia.	W. Tarassenko.	W. Tarassenko, cf. N. J., 1899, I, p. 463.	Olivine-norite.	
Fe (met) 0.04	Q 3.7 di 4.6 or 3.3 hy 13.8 ab 24.6 mt 5.1 an 39.2 il 3.7	Rowno, Volhynia, Russia.	S. Pfaffius.	A. Lagorio, T. M. P. M., VIII, p. 480, 1887.	Basalt.	Iron bearing. Al_2O_3 high? MgO low?
	Q 2.3 hy 25.5 or 7.8 mt 2.3 ab 20.4 an 38.6 C 0.9	Dargo, Victoria.	A. W. Howitt.	A. W. Howitt, cf. N. J., 1889, I, p. 121.	Quartz-diorite.	

SUBRANG. NOT NEEDED.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 0.10 FeS_2 0.25 Cr_2O_3 none V_2O_3 0.05 NiO 0.01 SrO none	Q 2.1 di 5.9 or 1.1 hy 18.6 ab 10.5 mt 6.0 an 48.4 il 4.3 ap 1.1	Stone Run, Cecil County, Maryland.	W. F. Hillebrand.	A. G. Leonard, B. U. S. G. S., 168, p. 45, 1900.	Diorite.	Not described.
Cl trace FeS_2 0.14 Cr_2O_3 none NiO none SrO none Li_2O trace	or 1.1 di 9.9 ab 6.8 hy 7.1 an 58.7 ol 8.2 mt 5.3 il 0.8	Phoenix Reservoir, Tuolumne County, California.	H. N. Stokes.	H. W. Turner, J. G., VII, p. 150, 1899.	Olivine-gabbro.	
	ab 4.7 di 5.6 an 69.5 hy 7.0 ol 6.6 mt 5.8	Talaya, Ural Mountains, Russia.	L.-Lessing and Kultacheff.	Loewinson-Lessing, G. S. K. Jushno-Saos., 1900, p. 166.	Pyroxene-granulite. (gabbro).	

ORDER 6. LENDOFELIC. NORGARE.

SUBRANG 2. DOPOTASSIC. FERGUSOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 trace Cl 0.05 SrO 0.07	or 45.0 di 24.7 ab 3.1 ol 1.2 an 3.9 mt 8.3 ne 11.6	Shonkin Creek, Highwood Mountains, Fergus County, Montana.	E. B. Hurlbut.	L. V. Pirsson, B. U. S. G. S., 148, p. 154, 1897.	Pseudoleucite-syenite.	

SUBRANG 3. SODIPOTASSIC. JUDITHOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 0.04 SO_3 none Cl 0.02 S 0.08	or 49.5 di 5.8 ab 6.3 wo 4.1 ne 27.8 mt 2.8	Diamond Jo Quarry, Magnet Cove, Arkansas.	H. S. Washington.	H. S. Washington, J. G. IX, p. 611, 1901.	Foyaite.	Cf. No. 4, laurdalose.
X 0.48 Cl 0.53 S 0.52 SrO 0.09 Li_2O trace	or 46.7 ac 3.2 ab 8.4 di 3.2 ne 27.8 wo 3.7 mt 5.3	Neasch's Gulley, Magnet Cove, Arkansas.	J. F. Williams.	J. F. Williams, A. R. Ark. G. S., 1890, II, p. 287, 1891.	Leucite-tinguaite.	Cl high?
Cl 0.08 Li_2O trace	or 54.5 ac 9.2 ab 7.9 di 5.2 ne 22.4 mt 0.5	Cone Butte, Judith Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, A. J. S., II, p. 192, 1896.	Tinguaite.	Also in 18 A. R. U. S. G. S. III, p. 569, 1898.

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. LAURDALASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
4	57.46	15.40	4.87	0.87	1.37	2.59	5.48	9.44	0.82	.009	0.13	0.60	0.21	trace	0.60	100.42 0.05	
A1. I	.958	.151	.030	.012	.034	.046	.088	.100				.008	.002	—	.004	100.37	
5	51.94	15.78	4.07	3.17	3.48	6.04	3.44	7.69	2.17			0.39	0.59	trace	0.42	99.83	
A1. I	.866	.155	.025	.044	.087	.108	.055	.082				.005	.004	—	.003		
6	56.06	20.10	3.82	n. d.	0.83	2.53	7.50	8.78	1.18							100.80	
A4. IV	.934	.197	(.017)	(.014)	.021	.046	.121	.093									

RANG 1. PERALKALIC. LAURDALASE.

1	53.74	14.02	10.63	1.71	Trace.	1.18	9.02	4.77	3.40					0.36		100.96	
B2. III	.896	.137	.066	.024	—	.021	.145	.051						.005			
2	52.53	18.31	0.34	6.43	1.82	3.15	7.26	6.47	1.16				1.59	0.15		99.93 .22	
A2. II	.876	.179	.002	.089	.046	.056	.117	.069					.011	.002		99.71	
3	54.04	20.27	4.66	0.64	0.16	2.75	8.56	6.79	1.93							99.80	
A3. III	.901	.198	.029	.009	.004	.049	.138	.072									
4	53.38	20.22	1.56	1.99	0.29	3.29	7.89	6.21	3.43					trace		100.03	
A3. III	.890	.198	.010	.028	.007	.059	.127	.066						—			
5	54.42	20.76	2.64	1.33	0.22	1.34	10.41	4.89	2.50	0.22		0.40	0.11	0.15	0.04	99.82	2.559
A1. I	.907	.203	.016	.018	.006	.024	.168	.053				.005	.001	.002	—		19.5°
6	47.61	14.26	4.90	4.07	2.62	8.71	6.70	4.08	1.89	0.26		1.38	1.38	0.30	0.41	100.68	2.79
A1. I	.793	.140	.031	.057	.066	.155	.108	.043				.017	.010	.004	.003		25°
7	55.90	19.00	2.05	2.54	1.10	3.12	8.49	5.41	n. d.			1.45		0.28		99.34	2.642
A2. II	.932	.186	.013	.035	.028	.056	.137	.058				.018		.004			
8	59.88	17.87	2.67	1.50	1.04	2.01	7.96	5.69	0.90			0.85	0.32	trace		100.69	
A2. II	.998	.175	.017	.021	.026	.036	.128	.061				.011	.002	—			
9	56.58	19.89	3.18	0.56	0.13	1.10	10.72	5.43	1.77					0.47		99.83	
A3. III	.943	.195	.020	.008	.003	.020	.173	.058						.007			
10	55.65	20.06	3.45	1.25	0.78	1.45	8.99	6.07	1.51							99.21	
B3. IV	.928	.197	.022	.017	.020	.026	.145	.065									
11	56.35	19.85	1.91	2.03	1.17	2.60	8.89	5.31	0.70			1.00	0.67	0.20		100.68	
A2. II	.939	.195	.012	.028	.029	.046	.143	.056				.012	.005	.003			
12	55.18	17.44	5.56	1.36	0.27	5.10	6.83	5.48	0.88			2.38				100.48	
A3. III	.920	.171	.035	.019	.007	.091	.110	.058				.030					
13	54.55	19.07	2.41	3.12	1.98	3.15	7.67	4.84	0.72			1.40	0.74	0.17		99.82	
A2. II	.909	.187	.015	.043	050	.056	.124	.051				.017	.005	.002			

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG. SODIPOTASSIC. JUDITHOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.13 Cl 0.20 F trace SrO 0.16 Li_2O trace	or 55.6 ac 13.9 ab 5.8 di 8.0 ne 9.9 wo 1.0 so 2.9 il 1.2	Bean Creek, Bearpaw Mountains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., II, p. 192, 1896.	Tinguaite.	
SO_3 0.29 Cl 0.08 SrO 0.28	or 45.6 di 16.9 ab 9.4 ol 1.8 an 5.0 mt 5.8 ne 7.1 il 0.8 no 2.8 ap 1.4	Shonkin Creek, Highwood Mountains, Montana.	W. M. Bradley.	L. V. Pirsson, B. U. S. G. S., 148, p. 152, 1897.	Trachyte.	
	or 51.7 ac 7.9 ab 2.6 di 8.0 ne 28.1 wo 1.3	Serra de Tingua, Brazil.	E. Hussak.	E. Hussak, N. J., 1892, II, p. 146.	Foyaite.	

SUBRANG 4. DOSODIC. LAURDALOSE.

ZrO_2 2.13	or 28.4 ac 27.3 ab 16.8 di 4.7 ne 15.3 mt 4.6 Z 3.1	Kangerdluarsuk, Greenland.	N. V. Ussing.	H. Rosenbusch, Elemente., p. 126, 1898.	Lujaurite.	Near judithose. Sum high.
Cl 0.40 F 0.32	or 38.4 di 2.9 ab 21.5 ol 11.0 ne 15.3 mt 0.5 so 5.3 ap 3.6 ft 0.8	Alton Township, Clinton County, New York.	E. W. Morley.	H. P. Cushing, B. G. S. A., IX, p. 248, 1898.	Syenite-porphyry.	Near judithose.
	or 40.0 ac 5.6 ab 15.2 di 0.9 ne 27.5 wo 5.2 mt 2.1 hm 1.1	Neasch's Gulley, Magnet Cove, Arkansas.	R. N. Brackett.	J. F. Williams, A. R. Ark. G. S., 1890, II, p. 287, 1891.	Leucite-tinguaite.	
FeS_2 1.77	or 36.7 di 6.0 ab 19.9 wo 3.3 an 1.4 mt 2.3 ne 25.5 pr 1.8	Diamond Jo Quarry, Magnet Cove, Arkansas.	Brackett and Smith.	J. F. Williams, A. R. Ark. G. S. 1890, II, p. 238, 1891.	Nephelite-syenite.	Not fresh? Cf. No. 1, judithose.
ZrO_2 0.15 Cl 0.23 S 0.01 Cr_2O_3 none NiO none SrO trace	or 29.5 ac 7.4 ab 23.6 di 4.9 ne 30.4 wo 0.6 il 0.8	Between Black and Big Mountains, Uvalde County, Texas.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 62, 1900.	Phonolite.	
ZrO_2 0.18 SO_3 1.17 Cl 0.37 F trace S 0.03 Cr_2O_3 trace NiO trace SrO 0.36 Li_2O trace	or 23.9 di 16.7 ab 19.9 wo 4.2 an 2.5 mt 7.0 ne 1.4 il 2.6 so 10.6 ap 3.3 no 4.9	Two Buttes, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 148, p. 182, 1897.	Tinguaite?	
	or 32.2 ac 4.2 ab 26.2 di 7.8 ne 22.2 wo 2.5 mt 0.9 il 2.8	Foia, Portugal.	G. Pajkull.	K.-Koschlau and Hackman, T. M. P. M., XVI, p. 262, 1896.	Mica-tinguaite.	
	or 33.9 ac 6.5 ab 36.7 di 7.8 ne 12.5 mt 0.7 il 1.7	Sundet, Asrum Lake, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 190, 1899.	Hedrumite.	
	or 32.2 ac 9.2 ab 25.7 ns 2.0 ne 25.0 di 2.8 wo 0.8	Hedrum, Laugendal, Norway.	G. Pajkull.	W. C. Brögger, Z. K., XVI, p. 41, 1890.	Tinguaite.	Border of dike. Cf. No. 10. Also in Eg. Kg. I, p. 113, 1894.
	or 36.1 ac 6.0 ab 22.0 di 6.1 ne 25.6 mt 2.1	Hedrum, Laugendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 191, 1894.	Tinguaite.	Center of dike. Cf. No. 9. Sum low.
	or 31.1 ac 1.8 ab 32.0 di 7.0 ne 22.2 ol 0.4 mt 1.9 il 1.8 ap 1.6	Pollen, Farrisvand, Laugendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 19, 1899.	Laurdalite.	
	or 32.2 di 1.5 ab 34.1 wo 8.3 an 0.8 il 2.9 ne 12.8 hm 5.6 pf 1.4	Sandefjord, Hedrum, Norway.	G. Pajkull.	W. C. Brögger, Z. K., XVI, p. 31, 1890.	Mica-syenite.	MgO low? CaO high?
	or 28.4 di 6.0 ab 34.0 ol 2.5 an 3.3 mt 3.5 ne 16.8 il 2.6 ap 1.7	Löve, Laugendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 19, 1899.	Laurdalite.	

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. LAURDALASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
14	53.81	19.69	6.20	3.63	0.85	1.73	7.77	4.58	1.52							99.78	
A3. III	.897	.193	.039	.050	.021	.031	.125	.049									
15	51.95	14.95	4.09	5.70	3.54	6.10	5.43	4.45	1.10			1.95	1.15	0.30		100.71	
A2. II	.866	.147	.026	.079	.089	.109	.088	.047				.024	.008	.004			
16	45.16	15.26	9.57	4.99	3.18	2.87	6.57	3.87	n. d.			6.98	1.54	0.63		100.62	
A2. II	.753	.150	.060	.069	.080	.051	.106	.041				.085	.011	.009			
17	50.26	20.15	3.67	2.62	1.43	3.28	8.09	4.67	3.85			0.24	0.05	trace		100.18	
A1. I	.838	.198	.023	.036	.036	.058	.130	.050				.003	—	—			
18	53.00	16.47	5.29	3.10	0.63	4.15	7.21	5.09	1.68	0.72	3.20	trace	trace	0.37		100.91	2.527
B2. III	.883	.161	.033	.043	.016	.074	.116	.055				—	—	.005			
19	55.10	19.25	2.77	1.66	0.83	5.14	7.41	4.68	2.19	0.40	0.22	0.48	0.41	0.32		100.86	2.544
A2. II	.918	.189	.017	.023	.021	.092	.120	.050				.006	.003	.005			
20	57.81	18.74	5.76	0.42	trace	1.28	9.35	4.52	1.50					trace		99.38	2.64
B3. IV	.964	.184	.030	.005	—	.023	.151	.048						—			
21	53.73	20.35	3.74	2.13	0.47	2.72	7.94	6.05	2.02			0.09		0.51		99.98	
A2. II	.896	.199	.023	.030	.012	.048	.128	.065				.001		.007			
22	60.41	17.44	1.98	1.78	1.85	2.79	7.51	5.64	0.51							99.91	
A3. III	1.007	.171	.013	.025	.046	.050	.121	.060									

RANG 2. DOMALKALIC. ESSEXASE.

1	51.35	20.21	4.90	n. d.	1.53	5.75	4.43	6.68	n. d.			0.80	0.28			100.04	
A3. III	.856	.198	.031	(.062)	.039	.103	.071	.071				.010	.002				
2	49.70	18.45	3.39	4.32	2.32	7.91	5.33	4.95	1.09	0.25		1.33	0.40	trace		99.44	
A2. II	.828	.181	.021	.060	.058	.141	.086	.053				.017	.003	—			
3	52.05	15.02	2.65	5.52	5.39	8.14	3.17	6.10	0.35			0.47	0.21	trace	0.42	100.03	
A1. I	.868	.147	.017	.076	.135	.145	.051	.065				.006	.002	—	.003		
4	50.11	17.13	3.73	3.28	2.47	5.09	3.72	7.47	4.47			0.82	0.67	trace	0.63	100.09	
A1. I	.835	.168	.023	.046	.062	.091	.059	.080				.010	.005	—	.004		
5	47.8	20.1	6.7	0.8	1.1	5.4	5.5	7.1	2.4			0.7		0.8	0.8	99.3	
B2. III	.797	.197	.042	.011	.028	.096	.089	.075				.009		.011	.005		
6	51.02	18.63	3.14	0.84	1.02	7.89	4.13	6.08	1.10		4.53	trace	0.16	0.59		99.66	2.480
A1. I	.850	.183	.020	.011	.026	.141	.066	.065				—	.001	.008			
7	50.24	20.09	2.54	5.65	3.65	7.83	2.97	7.45	0.36					trace		100.78	
A3. III	.837	.197	.016	.079	.091	.140	.048	.079						—			

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG 4. DOSODIC. LAURDALOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 27.2 di 2.7 ab 36.7 ol 1.9 an 5.3 mt 9.0 ne 15.6	Stoksund, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 116, 1890.	Syenite-pegmatite.	
	or 26.1 di 16.8 ab 28.3 ol 3.2 an 3.3 mt 6.0 ne 9.7 il 3.7 ap 2.7	Haö, Langesund Fjord, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 139, 1899.	Soda-minette.	
	or 22.8 ol 5.6 ab 32.0 il 10.6 an 0.8 hm 9.6 ne 12.8 pf 1.6 ap 3.6	Lyseböfjord, Norway.	P. Schei and L. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 19, 1899.	Olivine-laurdalite.	H_2O n. d. TiO_2 high?
SO_3 0.16 X 0.75	or 27.8 di 9.0 ab 21.0 ol 0.4 an 5.0 mt 5.3 ne 25.6 il 0.5	Alnö, Sweden.	P. Jannasch.	H. Rosenbusch, Elemente, p. 215, 1898.	Tinguaite.	
SO_3 none Cl none	or 30.6 ac 4.6 ab 25.2 di 8.4 ne 17.6 wo 4.4 mt 5.3	Near Topkowitz, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIX, p. 33, 1900.	Tinguaite-porphyry.	Not fresh.
	or 27.8 di 4.5 ab 32.5 wo 6.1 an 5.3 mt 3.9 ne 16.5 il 0.9	Mädstein, n. Neschwitz, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIV, p. 98, 1894.	Sanidine-phonolite.	
	or 26.7 ac 6.9 ab 41.9 wo 2.7 ne 15.9 mt 1.2 hm 2.6	Edda Gijorgis, Abyssinia.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 269, 1900.	Tinguaite.	Sum low.
Cl 0.23	or 36.1 di 4.4 ab 23.1 wo 2.7 an 1.7 mt 5.3 ne 23.9	Near Renseburg, Zwartkopjes, Transvaal.	E. A. Wülfing.	E. A. Wülfing, N. J., 1888, II, p. 32.	Nephelite-syenite.	Near miaskose
	or 33.4 ac 4.6 ab 36.2 di 11.5 ne 11.9 ol 1.2 mt 0.7	Tongging, Toba Lake, Sumatra.	W. Herz.	L. Milch, Z. D. G. G., LI, p. 70, 1899.	Trachyte-andesite.	Alkalies high?

SUBRANG 3. SODIPOTASSIC. BOROLANOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.04 Cl 0.06 FeS_2 4.01	or 39.5 di 11.0 ab 7.3 ol 4.7 an 15.6 il 1.5 ne 16.2 pr 4.0	Near Dr. Thornton's, Magnet Cove, Arkansas.	W. A. Noyes.	J. F. Williams, A. R. Ark. G. S., 1890, II, p. 263, 1891.	Nephelite-felsite.	
	or 29.5 di 18.4 ab 10.5 wo 0.8 an 11.7 mt 4.9 ne 18.7 il 2.6 ap 1.0	Schoolhouse, Magnet Cove, Arkansas.	H. S. Washington.	H. S. Washington, B. G. S. A., XI, p. 399, 1900.	Shonkinite (covite).	Complete in J. G. IX, p. 612, 1901.
SO_3 0.02 Cl 0.24 SrO 0.28	or 36.1 di 25.8 ab 6.3 ol 5.9 an 8.6 mt 3.9 ne 11.1 il 0.9	Middle Peak, Highwood Mountains, Montana.	E. B. Hurlbut.	L. V. Pirsson, B. U. S. G. S., 148, p. 154, 1897.	Monzonite.	Near monchiquose.
SO_3 0.08 Cl 0.07 SrO 0.35	or 44.5 di 10.6 ab 9.4 ol 2.9 an 8.1 mt 5.3 ne 11.6 il 1.5 ap 1.6	Palisade Butte, Highwood Mountains, Montana.	H. W. Foote.	L. V. Pirsson, B. U. S. G. S., 148, p. 153, 1897.	Syenite.	
SO_3 0.4	or 41.7 di 6.0 ab 1.6 wo 4.1 an 9.2 mt 0.7 ne 24.4 il 1.4 hm 6.2	Lake Borolan, Sutherland, Scotland.	J. H. Player.	Horne and Teall, Tr. R. Soc., Edin., XXXVI, Pt. I, p. 178, 1893.	Borolanite.	One decimal. Sum low.
SO_3 0.29 Cl 0.09 F trace Cr_2O_3 trace Cu 0.15	or 36.1 di 5.6 ab 14.1 wo 7.4 an 14.5 mt 2.6 ne 11.1 hm 1.4	Gennersbohl, Hegau.	G. F. Föhr.	G. F. Föhr, In. Diss. Wurzburg, p. 24, 1883.	Phonolite.	
	or 28.4 di 16.1 an 19.5 ol 6.9 lc 12.2 mt 3.7 ne 13.6	Monte Cavallo, n. Orvieto, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 370, 1897.	Leucite-tephrite.	Near subrang 2 of essexase.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. ESSEXASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	48.98	17.76	2.14	6.52	2.09	8.36	6.77	2.08	4.50		0.82	0.56				100.58	
A3. III	.816	.174	.013	.090	.052	.149	.109	.022				.007					
2	47.94	17.44	6.84	6.51	2.07	7.47	5.63	2.79	2.04			0.20	1.04			99.92	
A2. II	.799	.171	.043	.090	.052	.133	.091	.030				.003	.007				
3	46.99	17.94	2.56	7.56	3.22	7.85	6.35	2.62	0.65	——		2.92	0.94	trace	none	99.60	2.919
A2. II	.783	.176	.016	.105	.080	.140	.102	.029				.036	.006	——	——		12°
4	48.23	17.43	2.77	5.92	2.99	6.38	6.87	2.78	2.84	0.54		2.00	0.69	0.18	0.08	99.97	2.742
A1. I	.804	.171	.017	.082	.075	.114	.111	.030				.025	.005	.003	.001		23°
5	51.03	18.48	11.95	3.21	6.34	6.96	5.42	4.83	1.68							100.94 09	2.86
A3. III	.851	.181	.075	.044	.159	.124	.087	.051								100.85	
6	47.67	18.22	3.65	3.85	6.35	8.03	4.93	3.82	2.97	0.38				0.28		100.15	
A3. III	.795	.179	.023	.053	.159	.143	.080	.041						.004			
7	52.83	17.67	7.50	1.68	2.47	7.35	6.61	2.52	2.32							100.95	
B3. IV	.881	.173	.047	.023	.062	1.31	.107	.027									
8	46.39	19.03	9.79	0.96	5.33	7.02	5.47	2.47	2.04		0.26	0.72	0.88			101.21	2.779
B2. III	.773	.187	.061	.013	.133	.125	.088	.026				.009	.006				
9	55.11	20.08	2.30	3.87	1.67	5.06	7.88	3.16	0.59							99.72	
A3. III	.919	.197	.014	.054	.042	.090	.127	.034									
10	55.07	19.57	3.38	3.42	1.68	5.56	7.10	3.34	0.38							99.50	
A3. III	.918	.192	.021	.048	.042	.100	.114	.035									
11	51.90	22.54	4.03	3.15	1.97	3.11	8.18	4.72	0.22							99.82	
A3. III	.865	.221	.025	.044	.049	.056	.114	.050									
12	48.46	16.81	1.46	9.14	4.44	6.14	6.31	2.33	0.59		1.28	3.05	0.67	trace		100.68	
A2. II	.808	.165	.009	.127	1.11	.110	.102	.025				.038	.005	——			
13	51.91	19.58	6.39	2.30	0.54	5.50	7.70	3.32	0.50		trace	1.56	0.72	trace	trace	100.02	2.713
A2. II	.865	.192	.040	.032	.014	.098	.124	.034				.020	.005	——	——		
14	50.50	17.71	5.41	4.02	3.33	7.91	5.52	3.02	0.45			1.91	0.92			100.70	2.855
A2. II	.842	.174	.034	.056	.083	.141	.089	.032				.023	.006				
15	49.90	19.89	2.55	4.78	5.05	7.21	5.60	3.74	0.19	0.13		0.93	trace	trace		99.97	
A2. II	.832	.195	.016	.066	.126	.125	.090	.040				.011	——	——			
16	48.35	19.94	2.48	5.25	5.15	7.98	5.47	3.99	0.22	0.16		0.12	0.84	trace		99.95	
A2. II	.806	.195	.016	.073	.129	.142	.088	.042				.002	.006	——			

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG 4. DOSODIC. ESSEXOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 12.2 ab 21.0 an 12.0 ne 19.6	di 24.8 ol 1.4 mt 3.0 il 1.1	St. John, New Brunswick.	W. D. Matthew.	W. D. Matthew, Tr. N. Y. Acad., XIV, p. 213, 1895.	Diorite-porphyrite.	Not fresh.
		or 16.7 ab 25.7 an 13.9 ne 11.9	di 14.3 ol 3.1 mt 9.9 ap 2.3	Salem Neck, Essex County, Massachusetts.	M. Dittrich.	H. Rosenbusch, Elemente, p. 172, 1898.	Essexite.	TiO_2 low?
		or 16.1 ab 17.3 an 12.5 ne 19.6	di 17.7 ol 4.5 mt 3.7 il 5.5 ap 1.9	Salem Neck, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 57, 1899.	Essexite.	Dried at 110°.
ZrO_2 Cl S Cr_2O_3 V_2O_3 NiO SrO	0.04 0.03 0.08 none 0.04 trace 0.08	or 16.7 ab 23.6 an 8.3 ne 18.7	di 15.9 ol 3.7 mt 3.9 il 3.7 ap 1.7	Near Big Mountain, Uvalde County, Texas.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 61, 1900.	Basanite.	
SO_3 Cl	0.67 0.37	or 28.4 ab 13.6 an 15.6 ne 6.0 so 5.0 no 4.6	di 14.7 ol 6.4 mt 10.2 hm 5.0	Three Peaks, Crazy Mountains, Montana.	A. M. Comey.	J. E. Wolff, North. Transc. Surv., p. 11, 1885.	Theralite. (Rosenbusch.)	Al_2O_3 corrected, given as 8.48.
		or 22.8 ab 6.8 an 16.1 ne 19.0	di 19.2 ol 7.3 mt 5.3	Alabaugh Creek, Crazy Mountains, Montana.	G. Schneider.	J. E. Wolff, B. U. S. G. S., 150, p. 201, 1898.	Theralite.	
		or 15.0 ab 35.6 an 10.8 ne 11.1	di 13.4 wo 3.5 mt 5.3 hm 3.8	Sunium Point, Carmelo Bay, California.	J. Posada.	A. C. Lawson, B. Dep. G. Un. Cal., I, p. 38, 1893.	Carmeloite.	Sum high.
SO_3 Cl	0.47 0.38	or 14.5 ab 24.1 an 17.5 ne 11.9	di 9.1 ol 6.4 mt 0.9 il 1.4 hm 9.1 ap 2.0	Ferrera, Columbretes Islands, Spain.	R. Pfohl.	F. Becke, T. M. P. M., XVI, p. 173, 1896.	Inclosure in trachyte.	Sum high. Iron oxides? SO_3 and Cl from sea water?
		or 18.9 ab 35.1 an 10.0 ne 17.0	di 12.6 ol 2.4 mt 3.2	Stoksund, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 116, 1890.	Pressed rhombenporphyry.	Outer part of lense.
		or 19.5 ab 36.2 an 12.0 ne 12.8	di 13.1 ol 0.8 mt 4.9	Stoksund, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 116, 1890.	Pressed rhombenporphyry.	Inner part of lense.
		or 27.8 ab 25.2 an 15.6 ne 18.7	ol 5.4 mt 5.8	Lunde, Laugendal, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 33, 1890.	Laurdalite (nepheline-rich).	Cf. Eg. Kg., III, p. 19, 1899.
		or 13.9 ab 26.2 an 10.6 ne 11.8	di 13.1 ol 10.2 mt 2.1 il 5.8 ap 1.6	Brathagen, Laugendal, Norway.	O. N. Heidenreich.	W. C. Brögger, Eg. Kg., III, p. 106, 1899.	Heumite.	Center of dike, cf. No. 10, umptekose.
Cl S Cr_2O_3 SrO Li_2O	trace trace trace trace trace	or 18.9 ab 37.2 an 9.5 ne 15.1	di 3.1 wo 3.9 mt 2.8 il 3.1 hm 4.5 ap 1.7	Kauling, Rhöngebirge.	M. Scheidt.	H. Lenk, Vh. Ph. Med. Ges. Wurzb., XXI, p. 36, 1887.	Phonolite.	
		or 17.8 ab 21.0 an 14.7 ne 13.9	di 15.8 ol 2.5 mt 7.9 il 3.5 ap 2.0	Rongstock, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XIV, p. 99, 1894.	Dolerite (essexite).	Al_2O_3 as in T. M. P. M., XV, p. 487, 1895. Cf. No. 40, shoshonose.
		or 22.4 ab 13.6 an 18.1 ne 18.2	di 14.8 ol 7.6 mt 3.7 il 1.7	Hermos River, Kula, Asia Minor.	H. S. Washington.	H. S. Washington, J. G., VIII, p. 613, 1900.	Leucite-kulaite.	Hornblende-basalt.
		or 23.4 ab 8.9 an 18.1 ne 20.1	di 13.4 ol 10.1 mt 3.8 ap 1.8	Well Digging, Kula, Asia Minor.	H. S. Washington.	H. S. Washington, J. G., VIII, p. 613, 1900.	Kulaite.	Hornblende-basalt.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. SALEMASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	49.23	17.69	6.87	2.03	4.20	12.73	2.05	5.18	0.80				0.30			101.08	2.885
B3. IV	.821	.173	.043	.028	.105	.226	.033	.056									20°

RANG 3. ALKALICALCIC. SALEMASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	44.22	19.54	2.27	4.33	6.96	9.02	2.46	3.84	5.60			trace	trace	0.12		99.72	
A3. III	.737	.191	.013	.060	.174	.160	.040	.041				—	—	.002			
2	45.53	18.37	4.85	3.43	4.11	8.15	3.93	4.16	2.62	1.68	1.54	1.50	0.86	0.72		101.45	2.657
C2. IV	.759	.180	.030	.048	.103	.145	.063	.044				.018	.006	.010			

RANG 3. ALKALICALCIC. SALEMASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	45.20	17.12	5.98	6.55	5.29	7.89	4.23	2.31	5.35			0.68				100.60	
A3. III	.753	.168	.037	.091	.132	.141	.068	.024				.008					
2	45.32	18.99	3.78	9.78	4.68	9.19	3.78	2.12	0.31	0.09		1.94				99.98	2.975
A3. III	.766	.186	.023	.136	.117	.164	.061	.023				.024					11°
3	41.28	18.48	9.44	8.20	7.49	7.04	3.52	2.21	2.74							100.40	
A3. III	.688	.181	.059	.114	.187	.126	.056	.023									
4	50.47	18.73	4.19	4.92	3.48	8.82	4.62	3.56	0.58		trace	0.51	0.10	0.11		100.09	
A2. II	.841	.185	.026	.068	.087	.157	.074	.038				.006	.001	.002			
5	44.85	20.63	6.91	5.10	6.27	8.69	3.28	2.65	1.15	0.69				0.41		100.63	
A3. III	.748	.202	.043	.071	.157	.155	.053	.029						.006			
6	46.40	21.90	3.87	5.80	3.97	7.96	4.81	3.84	1.08							99.63	
A3. III	.773	.215	.024	.081	.099	.142	.078	.041									
7	44.50	20.31	2.27	8.84	3.90	11.44	3.70	1.64	1.40		trace	0.31	1.22	0.50		100.03	
A2. II	.742	.199	.014	.123	.098	.204	.059	.017				.004	.008	.007			
8	44.25	19.26	5.83	6.63	6.98	9.15	4.43	1.00	3.30			trace				100.83	
A3. III	.738	.188	.036	.092	.175	.162	.071	.011				—					
9	43.19	19.43	9.67	2.45	3.43	11.48	3.93	1.25	3.49	0.67		0.14	0.43			99.56	2.858
A2. II	.720	.190	.060	.034	.086	.205	.063	.013				.002	.003				15°
10	50.16	17.97	2.23	6.25	4.70	11.85	3.50	2.80	none			trace	trace	0.30		100.66	3.03
A3. III	.836	.176	.014	.087	.118	.211	.056	.030				—	—	.004			
11	48.60	17.87	6.20	5.76	4.32	9.11	4.66	2.06	1.78							100.36	2.77
A3. III	.810	.175	.039	.080	.108	.161	.075	.022									

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG 2. DOPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 31.1 di 22.7 an 23.4 wo 4.3 ne 9.4 mt 6.5 hm 2.4	Morolo, Ernici, Italy.	C. Viola.	C. Viola, N. J., 1899, I, p. 97.	Leucite-basalt.	Sum high.

SUBRANG 3. SODIPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 1.36	or 22.8 di 7.4 an 35.3 hy 5.6 no 9.4 ol 10.2 mt 3.0	Häsengebirge, n. Urberach, Hesse.	Kutscher and Rudolph.	C. Chelius, cf. N. J., 1892, II, p. 252.	Basaltic rock.	
	or 24.5 di 11.8 ab 12.1 ol 3.5 an 20.3 mt 7.0 ne 11.4 il 2.8 ap 1.9	Mädstein, n. Neschwitz, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIV, p. 103, 1894.	Camptonite.	Sum high. Not fresh.

SUBRANG 4. DOSODIC. SALEMOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 13.3 di 14.6 ab 17.8 ol 8.9 an 21.2 mt 8.6 ne 9.7 il 1.2	Portland Head, Portland, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXII, p. 344, 1898.	Camptonite.	
	or 12.8 di 14.2 ab 14.1 ol 11.9 an 28.4 mt 5.3 ne 9.7 il 3.7	Salem Neck, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 63, 1899.	Hornblende-gabbro.	
	or 12.8 di 5.5 ab 10.0 ol 16.8 an 28.4 mt 13.7 ne 10.5	Russell Mine, South Mountain, Pennsylvania.	C. H. Henderson.	C. H. Henderson, Tr. Am. Inst. M. E., XII, p. 82, 1884.	Basalt.	Near limburgose.
Cl trace	or 21.1 di 18.9 ab 17.3 ol 3.2 an 20.3 mt 6.0 ne 11.6 il 0.9	Mount Fairview, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, pr. Colo. Sc. Soc., II, p. 247, 1887.	Augite-diorite.	Also in 17 A. R. U. S. G. S., II, p. 324, 1896.
	or 16.1 di 7.8 ab 11.0 ol 11.3 an 33.4 mt 10.0 ne 9.1	Mount Franklin, Victoria, British Columbia.	F. G. Wait.	G. C. Hoffman, A. R. G. S. Can., VI., p. 31 R., 1895.	Lava.	
	or 22.8 di 10.5 ab 4.2 ol 8.6 an 26.7 mt 5.6 ne 19.9	Ullernas, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 49, 1890.	Syenite-diorite.	Border of mass. Cf. No. 16, pulaskose.
	or 9.5 di 12.8 ab 12.1 ol 13.3 an 34.2 mt 3.2 ne 10.2 ap 2.7	Steinburg, Westerwald, Rh. Prussia.	Jungeblodt.	A. Dannenberg, T. M. P. M., XVII, p. 480, 1898.	Augite-andesite.	
	or 6.1 di 12.9 ab 15.7 ol 13.2 an 29.5 mt 8.4 ne 11.6	Krotenkopf, Hesse.	Krauss.	K. Oebbeke, Jb. Pr. G. L-A., IX, p. 406, 1889.	Nephelite-basanite.	Near subrang 5.
SO_3 trace Cl trace	or 7.2 di 17.5 ab 16.2 ol 0.4 an 31.7 mt 7.9 ne 9.1 hm 4.2 ap 1.0	Spreudlingen, n. Frankfort a. M. Hesse.	Not stated.	C. Chelius, N. J. 1894, II, p. 419.	Hornblende-basalt.	
	or 16.7 di 27.5 ab 11.5 ol 5.8 an 25.0 mt 3.2 ne 9.7	Crater Walls, Kilauea, Hawaii.	C. Silvestri.	C. Silvestri, B. C. G. It., XIX, p. 191, 1888.	Augite-andesite.	
	or 12.2 di 18.8 ab 22.5 ol 5.2 an 21.7 mt 9.0 ne 9.1	Dyer's Pass, Canterbury, New Zealand.	R. Speight.	R. Speight, Tr. N. Z. Inst., XXVI, p. 409, 1894.	Dolerite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. SALEMASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	49.61	19.18	2.12	5.01	4.94	10.05	5.62	1.04	3.55				0.27			101.39	2.782
C3. V	.827	.188	.013	.070	.124	.180	.091	.011					.002				
2	47.30	18.27	2.24	6.95	6.78	7.95	5.99	1.00	0.07			1.47	1.61			99.63	2.856
A2. II	.788	.179	.014	.097	.170	.142	.097	.011				.018	.011				

RANG 4. DOCALCIC.

1	45.76	20.48	1.99	4.18	8.50	11.57	3.56	0.80	2.80							99.64	
A3. III	.763	.200	.013	.058	.213	.207	.057	.008									
2	45.11	19.67	4.32	8.57	5.65	10.45	3.87	0.64	0.83	0.17		0.21	0.25			100.07	
A2. II	.752	.192	.027	.120	.141	.186	.063	.006				.003	.002				
3	42.08	20.88	6.77	3.17	6.85	12.48	3.37	0.44	3.18							99.22	
B3. IV	.701	.204	.042	.044	.171	.223	.055	.005									

CLASS II. DOSALANE.

RANG 1. PERALKALIC. LUJAVRASE.

1	51.93	20.29	3.59	1.20	0.22	1.65	8.49	9.81	0.99	0.10	0.25	0.20	0.06	trace	0.09	100.58 .27	
A1. I.	.866	.199	.022	.018	.006	.030	.137	.104				.003	—	—	.001	100.31	
2	53.10	19.07	5.57	none	0.17	1.33	9.41	6.84	3.98		0.10					99.57	
A3. III.	.885	.187	.035	—	.004	.024	.152	.073									
3	52.16	20.14	6.45	n. d.	1.54	4.64	5.73	8.12	1.39		trace	trace		trace		100.17	
A4. IV.	.869	.197	.040	(.080)	.039	.083	.092	086				—		—			

RANG 1. PERALKALIC. LUJAVRASE.

1	51.62	15.63	6.06	4.98	trace	3.45	10.09	4.19	2.12					0.33		100.61	
A2. II.	.860	.153	.038	.069	—	.062	.163	.045						.005			
2	49.46	23.53	3.04	1.02	0.03	0.80	14.71	4.34	1.38							101.27 .51	
A2. II.	.824	.231	.019	.014	.001	.014	.237	.046								100.76	
3	48.13	18.44	3.41	4.30	3.06	5.89	8.00	3.80	1.59	0.18		1.74	0.49	0.19	0.10	99.93 .09	
A1. I.	.802	.180	.021	.060	.077	.105	.129	.040				.022	.003	.003	.001	99.84	
4	51.94	16.66	3.68	2.68	3.81	4.81	7.53	5.63	0.58			3.30		0.20		100.82	2.579
B2 III.	.866	.163	.023	.037	.095	0.86	.120	.060				.041		.003			
5	51.04	20.47	1.89	2.19	0.97	2.62	11.62	3.52	5.85		0.62	0.29	0.27			101.35	2.460
C2. IV.	.851	.200	.012	.030	.024	.047	.187	.038				.004	.002				
6	49.07	19.46	2.30	3.50	0.60	3.82	9.25	4.39	5.99		trace	0.64	trace	0.38		99.40	
B2. III.	.818	.191	.014	.049	.015	.068	.149	.047				.008		.005			

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG 5. PERSODIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3	trace	or 6.1 ab 23.1 an 23.9 ne 13.3	di 21.8 ol 6.6 mt 3.1	Point Sal, California.	H. W. Fairbanks.	H. W. Fairbanks, B. Dep. G., Un. Cal. II, p. 30, 1896.	Augite-teschenite.	Sum high.
		or 6.1 ab 29.3 an 19.7 ne 11.6	di 7.0 ol 16.1 mt 3.2 il 2.8 ap 3.9	Pedregal, Tlalpam, Mexico.	P. Krais.	Felix and Lenk, Btr. G. Mex. I, p. 103, 1890.	Basalt.	

SUBRANG 3. PRESODIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 4.4 ab 12.6 an 37.5 ne 9.4	di 16.0 ol 14.1 mt 3.0	Rosswein, Saxony.	Sachsse and Becker.	Sachsse and Becker, cf. N. J., 1893, II, p. 503.	Gabbro.	
FeS_2	0.33	or 3.3 ab 17.3 an 34.2 ne 8.5	di 14.7 ol 14.0 mt 6.4	Lindenfels, Hesse.	R. Marzahn.	C. Chelius, Erl. G. Kte. Hesse, IV Lief., p. 37, 1896.	Diorite.	
		or 2.8 ab 8.9 an 40.0 ne 10.8	di 17.2 ol 6.6 mt 9.7	Burberg, n. Carlsberg, Bohemia.	J. M. Clements.	J. M. Clements, Jb. G. R-A. Wien., XL, p. 345, 1890.	Basalt.	Sum low.

ORDER 7. LENFELIC. ITALARE.

SUBRANG 3. SODIPOTASSIC. JANEIROSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 Cl F SrO Li_2O	0.67 0.70 0.27 0.07 trace	or 33.9 lc 18.7 so 9.8 no 5.3	ac 10.2 di 5.7 il 0.5 ft 0.7	Beaver Creek, Bearpaw Mountains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., II, p. 196, 1896.	Leucite-tinguaite.	
		or 40.6 ab 5.8 ne 30.1	ac 16.2 di 1.0 wo 2.3	Km 37, Sta. Cruz R. R. Rio Janeiro, Brazil.	P. Jannasch.	H. Rosenbusch, Elemente, p. 215, 1898.	Tinguaite.	
SO_3 Cl	trace trace	or 41.1 an 5.3 lc 5.2 ne 26.5	di 15.2 ol 6.1	Poços de Caldas, Sao Paolo, Brazil.	F. W. Dafert.	E. Hussak, N. J. 1892, II, p. 149.	Leucitophyre.	

SUBRANG 4. DOSODIC. LUJAVROSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2	2.14	or 25.0 ab 7.9 ne 26.4 Z 3.1	ac 17.6 ns 2.0 di 15.4 ol 0.7	Kangerdluarsuk, Greenland.	N. V. Ussing.	H. Rosenbusch, Elemente, p. 126, 1898.	Lujaurite.	
ZrO_2 Cl	0.54 2.25	or 25.6 ab 8.9 ne 17.9 so 31.4 Z 0.7	ac 8.8 di 4.5	Kangerdluarsuk, Greenland.	N. V. Ussing.	H. Rosenbusch, Elemente, p. 126, 1898.	Sodalite-syenite.	
ZrO_2 Cl F S Cr_2O_3 NiO SrO	0.05 0.29 0.06 0.09 none 0.02 0.10	or 22.2 ab 14.1 an 3.1 ne 29.0	di 18.6 ol 0.8 mt 4.9 il 3.4 ap 1.1	Mount Inge, Uvalde County, Texas.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 61, 1900.	Basanite.	
		or 33.4 ab 7.3 ne 25.3	ac 7.9 di 18.5 ol 0.7 il 6.0 hm 1.0	Picota, Serra de Monchique, Portugal.	Zilliacus.	K.-Koschlau and Hackman, T. M. P. M., XVI, p. 272, 1896.	Camptonitic tinguaite.	
		or 21.1 ab 18.3 ne 36.4	ac 5.5 ns 1.4 di 11.0 ol 0.5	Elfdalen, Dalarne, Sweden.	P. Mann.	P. Mann, N. J. 1884, II, p. 193.	Phonolite.	(Cancrinite-aegirite-syenite.) Not fresh.
		or 26.1 ab 13.6 ne 33.5	ac 2.3 di 13.2 wo 1.6 mt 2.1 il 1.1	Sud Berge, Alnö, Sweden.	N. Sahlbom.	N. Sahlbom, N. J. 1897, II, p. 97.	Nephelinite.	Not fresh. Sum low.

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. LUJAVRASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
7	54.14	20.61	3.28	2.08	0.83	1.85	9.87	5.25	0.40			0.95		0.25		100.55	
A2. II.	.902	.202	.020	.030	.021	.033	.159	.057				.012		.004			
8	52.25	22.24	2.42	1.98	0.96	1.54	9.78	6.13	0.73			0.60		0.53		99.16	
B2. III.	.871	.218	.015	.028	.024	.027	.158	.065				.007		.008			

RANG 2. DOMALKALIC. VULTURASE.

1	49.73	19.20	5.50	2.41	(2.63)	7.96	1.99	9.39	1.19					trace		100.00	2.655
B3. IV.	.829	.188	.034	.033	.066	.142	.032	.100						—			
2	47.89	18.25	4.93	3.64	3.68	8.70	2.60	8.23	0.65			0.77				99.34	2.781
B2. III.	.798	.179	.031	.051	.092	.155	.042	.088				.010					
3	48.99	19.82	5.26	2.59	2.82	8.13	3.17	9.06	n. d.				0.33			100.17	
A3. III.	.817	.194	.033	.036	.071	.145	.051	.096					.002				

RANG 2. DOMALKALIC. VULTURASE.

1	50.55	20.48	2.66	4.02	4.24	7.30	8.37	2.27	0.44							100.33	
A3. III.	.843	.201	.017	.056	.106	.130	.135	.024									
2	42.46	18.49	3.35	6.31	3.64	8.70	7.12	4.58	2.31							99.92	
A3. III.	.708	.181	.021	.088	.091	.106	.114	.049									

RANG 3. ALKALICALCIC.

1	47.40	19.84	2.72	4.40	4.23	9.88	2.93	5.91	1.66			0.30				99.27	
B2. III.	.790	.194	.017	.061	.106	.177	.047	.063				.004					

RANG 3. ALKALICALCIC.

1	39.08	22.13	3.40	5.72	5.44	12.56	6.85	1.77	1.28			0.85	0.50	trace		99.58	2.910
A2. II.	.651	.217	.021	.079	.136	.224	.110	.019				.011	.003	—			
2	39.03	21.57	8.98	6.82	4.52	12.58	3.82	2.63	0.55							100.50	3.145
A3. III.	.651	.211	.056	.094	.113	.225	.061	.027									

CLASS II. DOSALANE.

RANG 1. PERALKALIC.

1	47.43	23.60	4.59	1.20	0.67	4.42	15.08	2.00	n. d.			0.10				99.09	
A3. III	.791	.231	.029	.017	.017	.078	.243	.021									

ORDER 7. LENFELIC. ITALARE—Continued.

SUBRANG 4. DOSODIC. LUJAVROSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 0.92 Cl 0.12	or 31.7 ac 6.5 ab 18.3 di 7.6 ne 31.2 mt 1.4 Z 1.3 il 1.8	Tschasnatschorr, Umptek, Kola, Finland.	F. Eichleiter.	F. Eichleiter, Vh. G. R-A. Wien, XXVII, p. 218, 1893.	Nephelite-syenite (lujavrite).	Also in V. Hackman, Fennia, XI, No. 2, p. 132, 1894.
	or 36.1 ac 2.3 ab 12.6 di 6.0 ne 36.6 ol 0.6 mt 2.3 il 1.1	Rabot's Spitze, Umptek, Kola, Finland.	V. Hackman.	V. Hackman, Fennia, XI, No. 2, p. 132, 1894.	Lujavrite.	Sum low.

SUBRANG 2. DOPOTASSIC. BRACCIANOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 28.4 di 14.2 an 15.6 wo 2.3 lc 21.4 mt 7.9 ne 9.1	Bracciano, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 49, 1897.	Leucite-tephrite.	MgO from loss.
	or 14.5 di 23.2 an 13.6 mt 7.2 lc 27.0 il 1.5 ne 11.9	Crocicchie, Lake Bracciano, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 49, 1897.	Leucitite.	Sum low.
	or 15.6 di 16.1 an 13.1 wo 3.9 lc 29.6 mt 7.7 ne 14.5	Lava of 1893, Mt. Vesuvius, Italy.	Mrha.	F. Becke, T. M. P. M., XVIII, p. 94, 1898.	Leucite-basanite.	MgO low?

SUBRANG 4. DOSODIC. VULTUROSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl trace	or 13.3 di 19.6 ab 17.8 ol 5.0 an 11.7 mt 3.9 ne 28.7	Cuyamas, San Luis Obispo County, California.	V. Lenher.	H. W. Fairbanks, B. Dep. G. Un. Cal., I., p. 293, 1895.	Analcite-diabase. (teschenite).	H_2O low?
SO_3 2.44 Cl 0.52	or 19.5 di 13.9 an 15.3 ol 8.2 lc 6.1 mt 4.9 so 6.9 no 21.3	Melfi, Monte Vulture, Italy.	C. F. Rammelsberg.	C. F. Rammelsberg, Z. D. G. G., XIII, p. 273, 1860.	Hauynophyr.	Cited for comparison. In Roth., 1861, p. 37.

SUBRANG 3. SODIPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 16.7 di 21.1 an 23.4 ol 4.3 lc 14.4 mt 3.9 ne 13.3	Orchi, Rocca Monfina, Italy.	A. Röhrig.	H. S. Washington, J. G., V, p. 247, 1897.	Leucite-tephrite.	Sum low.

SUBRANG 4. DOSODIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl trace S trace Cr_2O_3 trace	an 24.5 ol 14.8 lc 6.5 am 12.7 kp 1.3 mt 4.9 ne 31.2 il 1.6 ap 1.1	Lenbach, Rhöngebirge.	H. Lenk.	H. Lenk, Vh. Ph. Med. Ges. Wurzb., XXI, p. 54, 1887.	Nephelinite.	Al_2O_3 high?
	an 34.2 di 7.7 lc 11.8 ol 9.0 ne 17.3 am 6.9 mt 13.0	Kreuzberg, Rhöngebirge.	E. v. Seyfried.	E. v. Seyfried, cf. N. J., 1898, II, p. 61.	Nephelite-basalt.	

ORDER 8. FELDOLENIC. CAMPANARE.

SUBRANG 5. PERSODIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 11.7 ac 13.4 ab 1.6 ns 0.5 ne 58.5 di 7.9 wo 5.1	Penikkavaara, Kuuosamo, Finland.	M. Dittrich.	V. Hackman, B. G. G. Finl., No. 11, p. 22, 1900.	Soda-sussexite.	Low sum, due to H_2O?

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. VESUVASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	47.71	18.44	2.46	5.68	4.80	9.42	2.75	7.64	trace		none	0.37		trace		99.27	
B2. III	.795	.181	.015	.079	.120	.168	.044	.081	—			.005		—			
2	47.65	19.28	2.63	6.48	4.19	9.01	2.78	7.47	0.13	0.11	none	trace	0.50	trace		100.23	
A2. II	.794	.189	.016	.090	.085	.160	.045	.080				—	.003	—			

RANG 2. DOMALKALIC. VESUVASE.

1	38.11	20.84	5.67	1.46	3.80	14.44	6.65	2.12	4.51	0.57	0.65	0.48	0.84	0.14	none	100.60	
A1. I	.635	.204	.085	.020	.095	.258	.107	.023				.006	.006	.002	—		

CLASS II. DOSALANE.

RANG 1. PERALKALIC. URTASE.

1	44.40	19.95	5.15	2.77	1.75	8.49	6.50	8.14	1.17	0.24	0.12	1.53	0.37	0.08	0.01	100.76	2.770
A1. I	.740	.196	.032	.039	.044	.152	.105	.087				.019	.003	.001	—		26°
2	45.64	19.50	3.47	3.34	3.04	4.45	11.67	6.96	0.16			2.44		0.19		100.76	
A2. II	.761	.191	.022	.046	.076	.079	.187	.074				.031		.003			
3	46.48	19.00	4.74	2.30	2.49	4.35	8.46	6.78	3.31		0.36	1.22	0.15	trace		99.91	2.58
A1. I	.741	.186	.030	.032	.062	.078	.136	.072				.015	.001	—			

RANG 1. PERALKALIC. URTASE.

1	45.18	23.31	6.11	n. d.	1.45	4.62	11.17	5.95	1.14							98.92	
D4. V	.753	.228	(.038)	(.044)	.036	.082	.180	.064									
2	45.46	26.73	4.31	0.60	trace	2.09	15.07	4.23	0.44					0.12		99.05	
B3. IV	.758	.262	.027	.008	—	.037	.243	.045						.002			
3	45.43	28.77	3.10	0.40	0.22	1.86	16.16	3.38	n. d.							99.32	
A3. III	.757	.282	.019	.006	.006	.033	.261	.036									
4	45.28	27.37	3.53	0.49	0.33	1.22	17.29	3.51	0.40					0.19		99.53	
A3. III	.755	.268	.022	.007	.008	.022	.279	.037						.003			
5	43.02	24.63	3.59	2.17	1.96	5.47	14.81	2.99	n. d.			0.63	0.70			99.97	
A2. II	.717	.241	.022	.030	.049	.098	.239	.032				.008	.005				

ORDER 8. FELDOLENIC. CAMPANARE—Continued.

SUBRANG 2. DOPOTASSIC. VESUVOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 3.9 di 25.4 an 15.6 ol 5.4 lc 32.3 mt 3.5 ne 12.5 il 0.7	Lava of 1631, La Scala, Mount Vesuvius.	H. S. Washington.	H. S. Washington. Not published.	Leucite-basanite.	Sum low.
	or 13.3 di 19.9 an 17.8 ol 6.3 lc 24.4 mt 3.7 ne 12.8 ap 1.1	Lava of 1872, near Observatory, Mount Vesuvius.	H. S. Washington.	H. S. Washington. Not published.	Leucite-basanite.	

SUBRANG 4. DOSODIC.

ZrO_2 0.18 SO_3 none S 0.14	an 20.6 wo 5.7 lc 10.0 ol 6.7 ne 30.4 am 11.3 mt 3.2 il 0.9 hm 3.3 ap 2.0	Baptist church, Magnet Cove, Arkansas.	H. S. Washington.	H. S. Washington, J. G., IX, p. 619, 1901.	Biotite-ijolite.	Not fresh.

ORDER 9. PERLENIC. LAPPARE.

SUBRANG 3. SODIPOTASSIC. ARKANSOSE.

ZrO_2 0.03 SO_3 0.06 S none	an 1.1 di 9.6 lc 37.9 wo 12.0 ne 29.8 mt 4.9 il 2.8 hm 1.8	Diamond Jo Quarry, Magnet Cove, Arkansas.	H. S. Washington.	H. S. Washington, J. G., IX, p. 616, 1901.	Arkite (leucite-syenite).	
	lc 29.6 ac 10.2 ne 33.2 ns 5.9 kp 1.9 ol 7.0 am 8.1 il 4.5	Wudjavrtschorr, Umptek, Kola, Finland.	V. Hackman.	V. Hackman, Fennia, XI, No. 2, p. 151, 1894.	Nephelite-porphyry.	Alkalies high?
SO_3 0.19 Cl 0.08	lc 31.5 ac 10.2 ne 32.4 di 15.6 am 0.8 mt 1.9 il 2.3	Etinde Volcano, Kamerun, Africa.	M. Dittrich.	E. Esch, Sb. Berl. Ak., 1901, p. 299.	Leucitite.	

SUBRANG 4. DOSODIC. URTOSE.

	lc 27.9 ac 7.4 ne 46.6 di 1.0 ol 6.7 am 7.7	Beemerville, New Jersey.	J. F. Kemp.	J. F. Kemp, Tr. N. Y. Ac., XI, p. 67, 1892.	Nephelite-porphyry (sussexite).	
	lc 19.6 ac 12.0 ne 61.6 di 2.1 wo 3.3	Lujavr-Urt, Kola, Finland.	W. Petersson.	W. Ramsay, G. F. F., XVIII, p. 462, 1896.	Urtite.	Sum low. "TiO_2 ca. 2.00, with SiO_2."
	or 5.6 ac 6.9 lc 11.3 di 1.8 ne 69.9 wo 2.9 mt 0.9	Lujavr-Urt, Kola, Finland.	A. Zilliacus.	W. Ramsay, G. F. F., XVIII, p. 462, 1896.	Urtite.	Low sum, due to H_2O.
	lc 16.1 ac 10.2 ne 65.0 ns 3.4 di 3.4 wo 0.8	Lujavr-Urt, Kola, Finland.	N. Sahlbom.	W. Ramsay, G. F. F., XVIII, p. 462, 1896.	Urtite.	"TiO_2 ca 2.00, with SiO_2."
	lc 9.6 ac 10.2 kp 3.2 ns 1.0 ne 59.4 ol 5.8 am 8.2 mt 1.1 ap 1.7	Iivaara, Kuuosamo, Finland.	A. Zilliacus.	V. Hackman, B. C. G. Finl., No. 11, p. 17, 1900.	Ijolite (nephelite-rich).	

CLASS II. DOSALANE.

SECTION 1. C EXTREME OVER Z

RANG 2. DOMALKALIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	58.60	22.90	2.52	6.98	3.97	1.65	3.25	0.51	0.63							101.01	2.85
B3. IV	.977	.224	.016	.097	.099	.030	.052	.005									

SECTION 1. C EXTREME OVER Z.

RANG 2. DOMALKALIC.

1	50.10	27.60	3.65	9.14	3.86	1.53	3.04	0.81	1.00							100.73	2.92
A3. III	.835	.270	.023	.127	.097	.027	.049	.008									

RANG 3. ALKALICALCIC.

1	52.84	23.62	0.65	10.00	3.16	3.92	2.64	0.67	1.87			trace		0.43	none	99.80	2.83
A2. II	.881	.231	.004	.140	.056	.070	.042	.007				—		.006	—		
2	58.00	22.20	1.97	7.24	3.84	2.17	3.18	0.68	0.40							99.68	2.85
A3. III	.967	.218	.012	.100	.096	.039	.051	.007									

SUBCLASS II. Q+F+L DOMINANT OVER C+Z.

ORDER 3. QUARFELIC.

SUBRANG 3. PRESODIC.

		Q 23.4 or 2.8 ab 27.2 an 8.3 C 11.0	hy 21.3 mt 3.7	Le Pallet, Loire Infér., France.	A. Pisani.	A. Lacroix, B. S. C. G. Fr., LXVII, p. 23, 1899.	Norite.	Product of contact metamorphism?

ORDER 4. QUARDOFELIC.

SUBRANG 3. PRESODIC.

		Q 13.7 or 4.4 ab 25.7 an 7.5 C 19.0	hy 23.5 mt 5.3	Le Pallet, Loire Infér., France.	A. Pisani.	A. Lacroix, B. S. C. G. Fr., LXVII, p. 23, 1899.	Norite.	Product of contact metamorphism?

SUBRANG 3. PRESODIC.

SrO	none	Q 15.3 or 3.9 ab 22.0 an 19.5 C 11.4	hy 24.4 mt 0.9	Snowbank Lake, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 303, 1900.	Cordierite-norite.	Product of contact metamorphism?
		Q 21.4 or 3.9 ab 26.7 an 10.8 C 12.3	hy 21.1 mt 2.8	Le Pallet, Loire Infér., France.	A. Pisani.	A. Lacroix, B. S. C. G. Fr., LXVII, p. 23, 1899.	Norite.	Near order 3. Product of contact metamorphism?

CLASS III. SALFEMANE. SUBCLASS I. Q+F+L EXTREME OVER C+Z.

RANG 1. PERALKALIC. ROCKALLASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	68.75	5.91	5.81	5.33	0.08	2.11	7.52	4.28	n. d.							100.02	2.47
A3. III	1.146	.058	.036	.074	.002	.038	.121	.046									

RANG 1. PERALKALIC. ROCKALLASE.

1	73.60	4.70	13.10	n. d.	0.11	0.37	6.96	trace	n. d.				trace	0.93		99.83	2.8
A3. III	1.227	.046	.082	.032	.003	.006	.112	—					—	.012			

CLASS III. SALFEMANE.

RANG 3. ALKALICALCIC. VAALASE.

1	53.35	12.90	2.64	11.28	2.68	6.96	2.83	1.40	1.76	0.91		2.44	0.45	0.25	0.05	100.07	
A1. I	.889	.126	.016	.157	.067	.124	.045	.015				.030	.003	.004	—		
2	50.85	12.54	10.03	7.11	5.57	9.33	2.37	1.13	0.34				0.76			100.08	
A3. III	.848	.123	.062	.099	.139	.166	.039	.012					.005				
3	55.87	13.52	2.70	5.89	6.51	8.87	2.42	1.72	1.56	0.09		0.56	0.25	0.10	0.02	100.08	
A1. I	.931	.132	.017	.082	.163	.159	.039	.018				.007	.002	.001	—		
4	50.57	11.70	12.36	5.89	3.98	7.89	3.70	0.82	1.44			1.02				99.37	2.913
B2. III	.843	.115	.077	.082	.100	.141	.060	.009				.013					
5	49.07	10.60	12.03	6.57	4.68	8.58	2.56	1.76	1.70		1.65					99.20	3.020
B3. IV	.818	.104	.075	.092	.117	.153	.041	.019									
6	52.7	11.4	9.0	3.7	7.4	11.6	2.3	0.7	1.4							100.2	
A3. III	.878	.112	.056	.051	.185	.207	.037	.007									
7	52.67	10.62	10.43	4.21	7.04	11.70	2.19	0.65	0.38							99.89	
A3. III	.878	.104	.065	.058	.176	.209	.035	.007									
8	52.22	10.66	9.39	5.15	6.64	11.27	2.34	0.51								100.16	
A3. III	.870	.104	.059	.072	.166	.201	.038	.005									

RANG 4. DOCALCIC.

1	56.18	14.76	2.12	6.98	8.11	7.97	1.62	0.80	1.37				0.08	0.17		100.16	
A3. III	.936	.145	.013	.097	.203	.143	.026	.008					.001	.002			
2	52.11	13.70	1.22	9.86	8.08	12.16	1.31	0.16	0.53	0.06		0.32	0.05	0.20	none	99.79	
A1. I	.869	.134	.008	.138	.202	.217	.021	.002				.004	—	.003	—		
3	51.68	13.52	4.87	9.71	5.19	8.84	2.14	0.12	0.50	—	0.04	1.20	0.17	0.66	none	100.08	
A1. I	.861	.133	.030	.136	.130	.158	.034	.001				.015	.001	.009	—		
4	51.82	13.55	10.07	2.85	7.35	10.86	2.52	0.23	1.40							100.65	
A3 III	.864	.133	.063	.040	.184	.194	.040	.002									

ORDER 3. QUARFELIC. ATLANTARE.

SUBRANG 2. DOPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 28.0 ac 16.6 or 25.6 ns 8.5 ab 6.3 di 9.4 hy 5.1	Fossa del Gallo, Cuddia Randazzo, Pantelleria.	H. Förstner.	H. Förstner, Z. K., VIII, p. 179, 1884.	Pantellerite.	

SUBRANG 5. PERSODIC. ROCKALLOSE.

NiO 0.06	Q 38.0 ac 30.5 ab 24.1 di 1.4 hy 5.5	Rockall Island, N. Atlantic Ocean.	C. J. S. Makin.	J. W. Judd, Tr. R. Ir. Ac., XXXI, Pt. III, p. 54, 1897.	Rockallite.	MnO used in calculating norm.

ORDER 4. QUARDOFELIC. VAALARE.

SUBRANG 4. DOSODIC. VAALOSE.

FeS_2 0.13 Cr_2O_3 none V_2O_3 0.04 NiO trace SrO trace	Q 10.2 di 11.7 or 8.3 hy 15.3 ab 23.6 mt 3.7 an 18.3 il 4.6 ap 1.0	Teanaway River, Kittitas County, Washington.	W. F. Hillebrand.	G. O. Smith, B. U. S. G. S., 168, p. 225, 1900.	Basalt.	
SO_3 0.05	Q 8.6 di 17.8 or 6.7 hy 10.3 ab 20.4 mt 14.4 an 20.0 ap 1.7	Rockland Ridge, Columbia River, Washington.	E. A. Schneider.	E. A. Schneider, A. J. S., XXXVI, p. 237, 1888.	Augite-andesite.	
SrO none Li_2O trace	Q 8.0 di 19.0 or 10.0 hy 14.6 ab 20.4 mt 3.9 an 20.9 il 1.1	Emigrant Gap, Placer County, California.	W. F. Hillebrand.	W. Lindgren, B. U. S. G. S., 148, p. 212, 1897.	Gabbro.	Cf. No. 63, andose.
	Q 8.5 di 20.6 or 5.0 hy 0.5 ab 31.4 mt 16.2 an 12.8 il 2.0 hm 1.1	Rio de Janeiro, Brazil.	T. L. Bailey.	E. O. Hovey, T. M. P. M., XIII, p. 216, 1892.	Diabase.	Sum low.
	Q 7.0 di 26.3 or 10.6 hy 1.5 ab 21.5 mt 17.4 an 12.2	Rio de Janeiro, Brazil.	F. Quincke.	E. O. Hovey, T. M. P. M., XIII, p. 216, 1892.	Diabase.	Sum low.
	Q 9.2 di 30.1 or 3.9 hy 4.6 ab 19.4 mt 11.8 an 18.9 hm 0.8	Oudedrift, Beaufort West, Cape Colony.	Wappler.	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine-diabase.	Iron oxides?
	Q 10.7 di 31.8 or 3.9 hy 2.9 ab 18.3 mt 13.5 an 17.2 hm 1.1	Nel's Poort, Beaufort West, Cape Colony.	Holdermann.	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine-diabase.	
	Q 10.3 di 30.7 or 2.8 hy 3.8 ab 19.9 mt 13.7 an 17.0	Powder Tower, Colesburg, Cape Colony.	A. Bernthsen.	E. Cohen, N. J. B. B., V, p. 245, 1887.	Diabase-porphyrite.	

SUBRANG 3. PRESODIC.

	Q 12.1 di 9.4 or 4.4 hy 26.8 ab 13.6 mt 3.1 an 28.1	Rock Creek tunnel, Washington, D. C.	L. G. Eakins.	G. H. Williams, B. U. S. G. S., 148, p. 85, 1897.	Hornblende-diorite.	Not described.
ZrO_2 none S trace NiO 0.03 SrO none Li_2O trace	Q 10.5 di 29.4 or 1.1 hy 13.8 ab 11.0 mt 1.9 an 30.9 il 0.6	Near Cranberry, North Carolina.	W. F. Hillebrand.	A. Keith, B. U. S. G. S., 168, p. 52, 1900.	Diabase (garnetiferous).	
ZrO_2 trace SO_3 0.06 FeS_2 0.80 CoO 0.55 Cu 0.01 Pb 0.02	Q 10.4 di 13.9 or 0.6 hy 18.2 ab 17.8 mt 7.0 an 27.2 il 2.3	Mazaruni District. British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. contrib.	Diabase.	Dried at 100°.
	Q 8.6 di 22.3 or 1.1 hy 8.1 ab 21.0 mt 9.3 an 25.3 hm 3.7	Löbbes Farm, n. Rietfluss, Orange River Colony.	Ehrhardt and Schwedes.	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine-diabase.	Iron oxides?

CLASS III. SALFEMANE—Continued..

RANG 1. PERALKALIC. ORENDASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	54.17	10.16	3.34	0.65	6.62	4.19	1.21	11.91	1.01	0.52	0.49	2.67	1.59	0.06	0.59	100.21 0.17	2.699
A1. I	.903	.100	.021	.009	.166	.075	.019	.126				.033	.011	.001	.004	100.04	19°
2	54.08	9.49	3.19	1.03	6.74	3.55	1.39	11.76	2.71	0.79		2.08	1.35	0.05	0.67	99.97 0.21	2.686
A1. I	.901	.093	.020	.014	.169	.063	.022	.125				.026	.009	.001	.005	99.76	23°
3	53.70	11.16	3.10	1.21	6.44	3.46	1.67	11.16	2.61	0.80		1.92	1.75	0.04	0.62	100.40 0.19	2.627
A1. I	.893	.109	.019	.017	.161	.061	.027	.119				.024	.013	.001	.004	100.21	30°

RANG 1. PERALKALIC. ORENDASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	51.08	11.37	11.17	5.64	3.96	5.20	5.54	1.50	1.31	0.19		2.67	0.39	0.22		100.24	•
A2. II	.851	.111	.070	.078	.099	.093	.089	.016				.033	.003	.003			
2	49.57	9.61	5.59	4.59	1.28	13.91	4.90	3.23	0.38		none	0.65	5.98	0.57		100.26	
A2. II	.826	.094	.035	.064	.032	.248	.079	.034				.008	.042	.008			

RANG 2. DOMALKALIC. KILAUASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	50.41	12.30	5.71	3.06	8.69	7.08	0.97	7.53	1.80	0.46		1.47	0.46	0.15	0.23	100.42	2.88
A1. I	.840	.120	.035	.043	.217	.127	.016	.080				.018	.003	.002	.002		29°

RANG 2. DOMALKALIC. KILAUASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	49.13	9.05	3.57	5.05	17.21	5.68	2.01	2.24	3.50	0.84		0.42	0.38	0.15	0.05	99.67	
A1. I	.819	.088	.022	.071	.430	.101	.032	.023				.005	.003	.002	—		
2	48.95	12.98	3.63	4.68	11.73	7.66	2.31	3.96	3.16			0.49	0.67	0.13		100.35	
A2. II	.816	.127	.022	.065	.293	.136	.037	.042				.006	.005	.002			
3	47.32	11.22	2.91	5.81	15.96	7.11	1.88	3.79	1.71	0.31	0.13	0.75	0.61	0.11	0.22	99.89	
A1. I	.789	.110	.018	.080	.399	.127	.030	.040				.009	.004	.002	.002		

ORDER 5. PERFELIC. GALLARE.

SUBRANG 1. PERPOTASSIC. ORENDOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 0.22 SO_3 0.16 Cl 0.06 F 0.36 Cr_2O_3 0.05 NiO trace SrO 0.18	or 55.6 ks 4.1 ac 8.8 di 0.9 hy 16.2 il 1.4 tn 3.4 ap 3.7 ft 1.0	North Table Butte, Leucite Hills, Wyoming.	W. F. Hillebrand.	W. Cross, A. J. S., IV, p. 130, 1897.	Orendite.	
SO_3 0.29 Cl 0.04 F 0.49 Cr_2O_3 0.07 SrO 0.20 Li_2O trace	Q 2.2 or 51.7 ks 4.9 ns 0.2 ac 9.2 di 1.7 hy 16.1 il 2.2 tn 3.1 ap 3.2 ft 1.0	15-mile Spring, Leucite Hills, Wyoming.	W. F. Hillebrand.	W. Cross, A. J. S., IV, p. 130, 1897.	Orendite.	
SO_3 0.06 Cl 0.03 F 0.44 Cr_2O_3 0.04 SrO 0.19 Li_2O trace	or 60.6 ks 1.5 ns 1.0 ac 8.8 di 0.9 hy 10.7 ol 4.2 il 2.6 pf 0.9 ap 4.4 ft 0.7	15-mile Spring, Leucite Hills, Wyoming.	W. F. Hillebrand.	W. Cross, A. J. S., IV, p. 130, 1897.	Wyomingite.	

SUBRANG 4. DOSODIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 1.4 or 8.9 ab 46.6 an 1.7 di 18.8 hy 1.2 mt 10.4 il 5.1 hm 4.0	Front Royal, Virginia.	G. Steiger.	A. Keith, 14 A. R. U. S. G. S., II, p. 305, 1894.	Andesite.	Metamorphosed.
	or 18.9 ab 31.4 ac 8.8 di 16.3 wo 4.4 mt 3.9 il 1.2 ap 13.8	Ahvenvaara, Kuusamo, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Finl., XI, p. 36, 1900.	Pyroxene-apatite-syenite.	

SUBRANG 2. DOPOTASSIC. PROWERSOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 none SO_3 none Cl trace S none NiO 0.04 SrO 0.06	or 44.5 ab 4.2 an 6.7 ne 2.3 di 20.4 ol 8.6 mt 5.8 il 2.8 hm 1.6 ap 1.0	Two Buttes, Prowers County, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 148, p. 182, 1887.	Syenitic-lamprophyre.	

SUBRANG 3. SODIPOTASSIC. LAMAROSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cr_2O_3 0.39 NiO trace	or 12.8 ab 16.8 an 9.8 di 15.0 hy 17.7 ol 16.9 mt 5.1 il 5.9	Bear Creek, Madison Valley, Montana.	T. M. Chatard.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 641, 1895.	Basalt?	Near kentallenose.
	or 23.4 ab 17.8 an 13.3 ne 0.9 di 15.0 ol 18.5 mt 5.1 il 0.9 ap 1.7	Lamar River, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 938, 1895.	Absarokite.	Also in M. U. S. G. S., XXXII, p. 329, 1899.
Cr_2O_3 trace NiO trace SrO 0.05 Li_2O trace	or 22.2 ab 9.4 an 11.1 ne 3.4 di 16.4 ol 27.8 mt 4.2 il 1.4 ap 1.4	Sunlight Valley, Yellowstone National Park.	H. N. Stokes.	Hague and Jaggar, B. U. S. G. S., 168, p. 97, 1900.	Leucite-absarokite.	

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. KILAUASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	46.87	13.36	9.79	2.71	4.35	14.70	4.64	2.01	n. d.			1.98				100.41	
A3. III	.781	.131	.061	.038	.109	.262	.075	.021				.025					
2	46.52	10.48	4.40	7.79	10.58	9.49	3.12	1.55	1.79		trace	2.98	0.83	0.11		100.37	2.99
A1. I	.775	.103	.028	.108	.265	.169	.050	.016				.037	.006	.002			
3	52.85	13.25	2.36	8.71	6.84	8.47	4.72	1.53	0.93			0.35	0.40			100.41	2.93
A2. II	.881	.130	.015	.121	.171	.151	.076	.016				.004	.003				
4	49.16	14.17	4.62	6.60	7.01	6.45	4.61	2.23	4.22		in H_2O	0.42	trace			99.49	2.72
A3. III	.819	.139	.029	.092	.175	.115	.074	.023				.005	—				
5	46.84	13.98	8.99	5.46	0.80	10.41	3.59	2.59	2.69	0.47	0.30	1.88	0.59	1.79		100.38	2.794
A2. II	.781	.137	.056	.076	.020	.186	.058	.028				.023	.004	.026			
6	44.17	11.24	9.97	6.22	6.55	10.77	3.04	1.97	2.31			2.83				99.07	
B2. III	.736	.110	.062	.086	.164	.193	.049	.021				.035					
7	54.53	13.06	6.85	4.86	3.14	9.83	4.62	1.59	0.52			0.96				99.44	2.687
B2. III	.909	.128	.043	.068	.078	.176	.074	.018				.012					
8	53.09	10.87	8.03	3.87	8.85	9.63	3.23	1.57	1.13							100.27	
A3. III	.885	.106	.050	.054	.221	.171	.051	.017									
9	49.45	13.97	8.10	11.17	1.90	5.92	5.05	1.75	1.19			trace	0.16	0.85		99.51	2.74
A2. II	.824	.137	.050	.156	.048	.105	.082	.019				—	.001	.012			
10	47.63	15.02	8.15	10.40	3.50	6.87	4.92	1.80	0.30			0.12	0.08	0.80		99.59	2.76
A2. II	.794	.147	.051	.144	.088	.123	.079	.020				.002	.001	.011			

RANG 2. DOMALKALIC. KILAUASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	41.32	10.95	15.13	7.36	3.56	10.33	4.19	0.85	4.38		0.20	0.35	0.97			99.59	
A2. II	.689	.107	.094	.102	.089	.184	.068	.009				.004	.007				

RANG 3. ALKALICALCIC. CAMPTONASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	49.71	13.30	4.41	3.37	7.96	8.03	1.49	4.81	4.07			1.57	0.66	0.17	0.46	100.01	
A1. I	.829	.130	.027	.048	.199	.143	.024	.051				.019	.005	.002	.003		
2	48.36	12.42	5.25	2.48	9.36	8.65	1.46	3.97	5.54			1.18	0.84	0.13	0.29	99.93	
A1. I	.806	.122	.033	.035	.234	.154	.023	.042				.014	.006	.002	.002		
3	49.03	15.18	2.07	6.32	6.05	12.58	1.49	4.07	2.09				0.86	0.19		99.93	2.743
A?3. III?	.817	.149	.013	.088	.151	.225	.024	.043					.006	.003			
4	52.35	15.08	Trace.	8.38	5.41	11.12	1.28	4.12	1.84				0.85	trace		100.43	2.735
A?3. III?	.873	.147	—	.117	.135	.198	.021	.043					.006	—			
5	49.63	11.90	2.64	9.16	8.02	12.78	1.08	3.58	1.27				trace	trace		100.06	2.876
A?3. III?	.827	.117	.016	.128	.201	.228	.018	.038					—	—			25°

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. KILAUOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 11.7 ab 27.2 an 9.7 ne 6.5	di 17.0 wo 13.7 mt 3.2 il 3.9 hm 7.5	Birdsboro, Norristown, Pennsylvania.	H. Fleck.	W. C. Day, 19 A. R. U. S. G. S., VI, p. 222, 1898.	Diabase.	Iron oxides? CaO high? MgO low?
X Li_2O	0.73 trace	or 8.9 ab 24.1 an 10.3 ne 1.1	di 24.6 ol 14.8 mt 6.5 il 5.7 ap 1.9	Volcano Butte, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 130, 1896.	Basalt.	
		or 8.9 ab 35.1 an 10.6 ne 2.6	di 23.4 ol 14.0 mt 3.5 il 0.6 ap 1.0	Cerro San Miguel, Puebla, Mexico.	A. Hoppe.	A. Hoppe, in Felix and Lenk, Btr. G. Mex., II, p. 215, 1899.	Basalt.	
S	trace	or 12.8 ab 29.3 an 11.7 ne 5.1	di 16.5 ol 12.4 mt 7.5	Bärenstein, Thuringia.	R. Pohlmann.	R. Pohlmann, N. J. B. B., III, p. 97, 1885.	Kersantite.	Not fresh. Center of dike. Cf. No. 8, kersantite, Pt. II.
		Q 0.2 or 15.6 ab 30.9 an 14.2	di 10.1 wo 8.9 mt 13.0 il 3.5 ap 1.3	Falkenberg, Tetschen, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIV, p. 107, 1894.	Nephelite-leucite-tephrite.	Alkalies low? MnO high.
		or 11.7 ab 15.7 an 11.1 ne 5.4	di 33.1 ol 0.8 mt 12.1 il 5.4 hm 1.6	Mokraja Wolnowacha, Mariupol, Russia.	J. Morozewicz.	J. Morozewicz, cf. N. J., 1900, I, p. 394.	Augitite.	Sum low. Near monchiquose.
		Q 3.2 or 10.0 ab 38.8 an 10.0	di 20.0 hy 5.7 mt 10.0 il 1.8	Mount Kouragio, Ægina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Augite-hypersthene-andesite.	Sum low.
		Q 2.6 or 9.5 ab 26.7 an 10.6	di 29.0 hy 9.2 mt 11.6	Richmond, Cape Colony.	Kinnicut and Birney.	E. Cohen, N. J. B. B., V, p. 234, 1887.	Diabase.	
		or 10.6 ab 38.3 an 10.0 ne 2.6	di 16.4 ol 7.9 mt 11.6	Crater walls, Kilauea, Hawaii.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 178, 1888.	Basalt.	
		or 11.1 ab 28.3 an 13.3 ne 7.1	di 17.5 ol 9.1 mt 11.8	Crater walls, Kilauea, Hawaii.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 181, 1888.	Basalt.	

SUBRANG 5. PERSODIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 5.0 ab 28.8 an 8.3 ne 3.7	di 19.3 wo 4.9 mt 21.8 il 0.6 ap 2.3	Gedern, Vogelsberg, Hesse.	J. M. Ledroit.	J. M. Ledroit, Ber. Oberh. Ges., XXIV, p. 152, 1886.	Basalt.	Al_2O_3 low? Fe_2O_3 high?

SUBRANG 2. DOPOTASSIC. ABSAROKOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cr_2O_3	trace	or 28.4 ab 12.6 an 15.2	di 15.6 hy 12.1 ol 0.5 mt 6.3 il 2.9 ap 1.6	Cache Creek, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 938, 1895.	Absarokite.	Also in M. U. S. G. S., XXXII, II, p. 329, 1899.
Cr_2O_3	trace	or 23.4 ab 12.1 an 15.8	di 17.2 hy 13.3 ol 1.6 mt 4.9 il 2.2 hm 1.9 ap 1.8	Clark's Fork River, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 938, 1895.	Absarokite.	Also in M. U. S. G. S., XXXII, II, p. 329, 1899.
		or 23.9 ab 6.3 an 22.8 ne 3.4	di 27.7 ol 8.5 mt 3.0 ap 2.0	Toscanella, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Ac., 1888, p. 111.	Leucite-basanite.	Also in N. J. B. B., VI, p. 23, 1889. Alkalies low?
		or 23.9 ab 11.0 an 23.1	di 22.0 hy 14.8 ol 2.3 ap 2.0	Mezzano, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Ac., 1888, p. 106.	Leucite-tephrite.	Also in N. J. B. B., VI, p. 19, 1889. Alkalies low?
Li_2O	trace	or 21.0 ab 4.7 an 17.0 ne 2.6	di 38.0 ol 12.0 mt 3.7	Mte. Jugo, Montefiascone, Italy.	L. Ricciardi.	L. Ricciardi, Att. Soc. Ital. Mil., XXVIII, p. 130, 1885.	Basalt.	Alkalies low?

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	52.37	15.06	2.34	9.82	5.38	7.33	4.04	0.92	2.24			0.21		0.32		100.03	2.965
A2. II	.873	.148	.014	.137	.135	.130	.065	.010				.003		.005			
2	45.15	15.39	2.76	5.64	6.38	8.83	2.67	2.77	2.85		4.27	2.80	0.56	0.14		100.21	2.70
A2. II	.756	.151	.017	.078	.160	.158	.043	.029				.035	.004	.002			
3	50.82	11.44	0.25	8.94	14.01	8.14	1.79	3.45	0.58			0.59	0.20	0.19	0.06	100.49	
A1. I	.847	.112	.002	.124	.350	.145	.029	.037				.007	.001	.003	—		
4	46.90	10.17	1.22	5.17	20.98	6.20	1.16	2.04	4.38	1.04		0.41	0.44	0.10		100.54	2.86
A1. I	.782	.100	.007	.072	.525	.110	.019	.022				.005	.003	.001			
5	49.22	12.02	2.77	8.80	9.29	10.56	1.90	1.70	1.63	0.27		0.95	0.43	trace	0.03	99.77	
A1. I	.820	.118	.017	.122	.232	.189	.030	.018				.012	.003	—	—		
6	51.76	12.36	4.88	4.60	9.57	7.14	1.99	3.83	3.05			0.47	0.56	0.11		100.32	
A2. II	.863	.121	.030	.064	.239	.127	.032	.040				.006	.004	.002			
7	51.68	14.07	4.71	4.57	7.72	6.65	2.45	4.16	2.09			1.08	0.72	trace		100.03	
A2. II	.861	.138	.029	.064	.193	.119	.040	.045				.013	.005	—			
8	50.59	11.53	1.83	7.64	11.27	8.79	2.27	2.33	1.76	0.21		0.80	0.48	0.17	0.10	99.90	
A1. I	.843	.112	.011	.106	.282	.157	.037	.025				.010	.003	.002	.001		
9	48.73	11.92	4.79	4.56	5.93	9.24	2.62	2.47	1.52		5.80	1.34	0.32	0.36	trace	100.05	
A1. I	.812	.117	.030	.064	.148	.165	.042	.026				.017	.002	.005	—		
10	47.25	15.14	5.05	4.95	6.87	9.98	2.39	2.60	2.12	0.40	1.87	1.22	0.25	0.17	0.08	100.46	2.906
A1. I	.788	.148	.032	.069	.172	.178	.039	.027				.015	.002	.002	.001		21°
11	52.09	11.93	1.84	7.11	12.48	7.84	2.04	3.01	0.35		0.16	0.73	0.34	0.15		190.24	2.94
A1. I	.885	.117	.012	.099	.312	.140	.032	.032				.009	.002	.002			
12	54.09	15.02	4.12	5.15	7.28	7.72	1.99	3.55	1.49							100.39	
A3. III	.902	.147	.025	0.72	.182	.137	.032	.038									
13	50.35	15.76	2.32	7.30	7.40	10.12	2.75	3.89	0.45			0.30	0.39	0.35		101.38	
C2. IV	.839	.155	.015	.101	.185	.181	.044	.041				.004	.003	.007			
14	50.00	13.99	5.13	9.10	4.06	10.81	3.02	2.87	0.24				0.71	0.42		100.35	
A3. III	.833	.137	.032	.126	.102	.193	.048	.030					.005	.006			
15	54.50	13.67	0.63	11.44	3.25	6.41	2.97	3.07	0.13	0.15		2.18	0.46	0.21		99.60	
A2. II	.908	.134	.004	.159	.081	.114	.048	.033				.027	.003	.003			
16	46.67	12.64	6.13	10.07	5.64	11.48	1.64	2.31	2.64				0.74	0.19		100.49	2.703
A3. III	.778	.124	.038	.140	.141	.205	.026	.024					.005	.003			11°
17	45.57	13.07	6.72	12.43	2.80	6.79	2.04	3.36	6.06				0.52	0.21		99.85	2.331
A3. III	.760	.128	.042	.172	.070	.121	.032	.036					.004	.003			11°

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 3. SODIPOTASSIC. KENTALLENOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 5.6 ab 34.1 an 20.3	di 13.1 hy 14.4 ol 6.5 mt 3.2	Meriden, Connecticut.	J. F. Pratt.	W. C. Day, 18 A. R. U. S. G. S., V, p. 958, 1897.	Diabase.	
Li_2O	trace	or 16.1 ab 18.9 an 22.0 ne 2.0	di 15.0 ol 8.7 mt 3.9 il 5.4 ap 1.3	Fourmile Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 112, 1896.	Augite-vogesite.	Not fresh.
Cr_2O_3 NiO	0.03 trace	or 20.6 ab 12.6 an 12.8 ne 1.4	di 22.3 ol 28.6 mt 0.5 il 1.1	Bet. South Boulder and Antelope Creeks, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 670, 1895.	Lamprophyre.	
Cr_2O_3	0.33	or 12.2 ab 10.0 an 16.4	di 9.5 hy 13.0 ol 30.3 mt 1.6 il 0.8 ap 1.0	Fort Ellis, n. Bozeman, Montana.	T. M. Chatard.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 640, 1895.	Basalt?	Not fresh.
SO_3 Cl S SrO	0.04 0.08 0.05 0.03	or 10.0 ab 15.7 an 19.5	di 24.5 hy 14.5 ol 6.6 mt 3.9 il 1.8 ap 1.0	Red Mountains, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899.	Gabbro.	Contact facies of granite.
		or 22.2 ab 16.8 an 13.6	di 14.4 hy 21.0 mt 7.0 il 0.9 ap 1.4	Raven Creek, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 938, 1895.	Absarokite.	Also in M. U. S. G.S. XXXII, p. 329, 1899.
SO_3 Li_2O	0.13 trace	or 25.0 ab 21.0 an 14.7	di 11.7 hy 13.1 ol 2.7 mt 6.7 il 2.0 ap 1.7	Two Ocean Pass, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M. U. S. G.S., XXXII, p. 329, 1899.	Absarokite.	
SO_3 Cl V_2O_3 NiO SrO Li_2O	none trace 0.04 0.06 0.03 trace	or 13.8 ab 19.4 an 13.9	di 22.4 hy 8.7 ol 14.1 mt 2.6 il 1.5 ap 1.0	Indian Creek laccolith, Yellowstone National Park.	W. F. Hillebrand.	J. P. Iddings, M.U.S.G.S., XXXII, p. 83, 1899.	Augite-andesite.	Lower part of sheet; cf. No. 12, monzonose.
SO_3 Cl Li_2O	0.34 0.11 trace	Q 1.4 or 14.5 ab 22.0 an 13.6	di 25.6 hy 5.0 mt 7.0 il 2.5	Bighorn Pass, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, M.U.S.G.S., XXXII, p. 70, 1899.	Kersantite.	Not fresh.
S V_2O_3 NiO SrO Li_2O	none 0.05 0.02 0.05 trace	or 15.0 ab 17.8 an 22.8 ne 1.4	di 21.4 ol 7.2 mt 7.4 il 2.3	Snowstorm Peak, La Plata Mts., Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 1698, p. 162, 1900.	Camptonite.	Not fresh.
Cr_2O_3 NiO	0.10 0.07	or 17.8 ab 16.8 an 14.7	di 19.4 hy 14.9 ol 12.3 mt 2.8 il 1.4	Glen Shira, Argyllshire, Scotland.	W. Pollard.	Hill and Kynaston, Q. J. G. S., LVI, p. 537, 1900.	Kentallenite.	
		Q 2.3 or 21.1 ab 16.8 an 21.4	di 13.5 hy 17.9 mt 5.8	Ben an Fhurain, Inchnadampf, Scotland.	J. J. H. Teall.	J. J. H. Teall, G. M., XXIII, p. 350, 1886.	Diorite-porphyrite.	Near shoshonose.
		or 22.8 ab 11.0 an 18.3 ne 6.5	di 23.6 ol 13.1 mt 3.5 il 0.6 ap 1.0	Smälingen, Fahlun, Sweden.	L. Schmelck.	W. C. Brögger, Eg. Kg. II, p. 46, 1895.	Olivine-monzonite.	Sum high.
SO_3 Cl	trace trace	or 16.7 ab 22.0 an 16.4 ne 1.7	di 26.8 ol 6.8 mt 7.4 ap 1.7	Lava of 1891, Stromboli, Æolian Islands.	L. Ricciardi.	Ricco and Mercalli, Ann. Uff. Meteor, XI, p. 202, 1892.	Basalt.	
Cl S	0.12 0.25	Q 3.3 or 18.3 ab 25.2 an 14.7	di 12.0 hy 19.0 mt 0.9 il 4.2 ap 1.1	Goroschki, Volhynia, Russia.	W. Tarassenko.	W. Tarassenko, cf. N. J., 1899, I, p. 463.	Pyroxene-syenite.	
Cr_2O_3	0.34	or 13.3 ab 13.6 an 20.6	di 26.4 hy 8.3 ol 4.5 mt 8.8 ap 1.7	Assab, n. Massowa, Abyssinia.	L. Ricciardi.	L. Ricciardi, B. Soc. G. Ital., V, p. 58, 1886.	Basalt.	
Cr_2O_3	0.28	or 20.0 ab 16.8 an 16.7	di 11.4 hy 14.6 ol 2.9 mt 9.7 ap 1.3	Assab, n. Massowa, Abyssinia.	L. Ricciardi.	L. Ricciardi, B. Soc. G. Ital., V, p. 59, 1886.	Basalt.	Not fresh.

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	43.94	16.17	3.96	10.06	5.05	9.59	2.93	1.51	1.42	0.13	0.09	4.13	0.69	trace	none	99.67	
A2. II	.732	.159	.025	.140	.126	.171	.047	.016				.052	.005	—	—		
2	42.73	14.50	4.03	7.28	5.46	8.46	3.11	2.28	3.08	0.36	3.76	4.30	0.93	0.19	trace	100.65	
A1. I	.713	.142	.025	.101	.137	.151	.050	.023				.054	.006	.003	—		
3	48.22	14.27	2.46	9.00	6.24	8.45	2.90	1.93	1.66	0.28	0.15	2.79	0.64	0.20	0.04	99.80	
A1. I	.804	.140	.015	.125	.156	.151	.047	.020				.035	.004	.003	—		
4	47.12	14.43	3.33	11.71	6.05	9.63	2.58	1.11	0.34	0.28		3.27				99.85	3.072
A2. II	.785	.142	.021	.163	.151	.172	.042	.012				.041					12°
5	52.37	15.06	2.34	9.82	5.38	7.33	4.04	0.92	2.24			0.21		0.32		100.03	
A2. II	.873	.147	.015	.187	.135	.130	.065	.010				.003		.005			
6	47.16	14.45	1.61	13.81	5.24	8.13	3.09	1.20	0.48	0.12	0.35	3.37	0.57	0.24	trace	99.98	
A1. I	.786	.142	.010	.192	.131	.144	.050	.013				.042	.004	.003	—		
7	46.74	16.63	2.17	10.60	6.11	8.66	3.81	0.86	0.73	0.12	0.07	2.54	0.33	0.26	trace	99.77	
A1. I	.779	.163	.014	.147	.153	.154	.061	.009				.032	.002	.004	—		
8	44.77	12.46	4.63	12.99	5.34	10.20	2.47	0.95	0.48	0.12	0.37	5.26	0.28	0.17	trace	100.75	3.090
A1. I	.736	.122	.029	.180	.134	.182	.040	.010				.064	.002	.002	—		
9	50.34	15.23	2.82	11.17	5.81	9.61	2.93	1.02	0.07	0.19		1.56	0.20	0.14		101.09	2.968
B2. III	.839	.149	.018	.155	.145	.172	.047	.011				.019	.001	.002			
10	48.11	14.74	2.54	11.85	5.10	6.72	2.92	1.92	1.73	0.27		3.17	0.44	0.19	0.04	99.96	
A1. 1	.802	.144	.015	.165	.128	.120	.047	.020				.040	.003	.003	—		
11	48.85	15.83	2.50	10.79	5.82	6.20	2.79	1.31	3.77	0.27	none	1.28	0.22	0.11	none	99.89	
A1. 1	.814	.155	.016	.150	.146	.110	.045	.014				.016	.002	.002	—		
12	45.65	15.20	6.71	13.81	2.95	6.33	3.09	1.05	2.29			1.66	0.25	0.71	none	99.70	
A1. 1	.761	.149	.042	.192	.074	.112	.050	.011				.021	.002	.010	—		
13	48.47	16.07	4.12	7.47	5.96	4.84	2.43	1.41	4.63	2.30		1.51	0.44	0.23	0.03	100.15	
A1. I	.808	.157	.026	.104	.149	.086	.039	.015				.019	.003	.003	—		
14	53.56	16.07	3.21	5.29	7.23	8.77	3.06	1.94	0.19			0.68	0.18	0.11		100.29	
A2. II	.893	.158	.020	.073	.181	.157	.049	.021				.008	.001	.002			
15	51.81	15.24	3.66	4.86	8.89	9.06	2.83	2.08	0.67			0.77	0.18	0.08		100.13	
A2. II	.864	.149	.023	.068	.222	.162	.045	.022				.010	.001	.001			
16	51.70	15.18	2.09	8.54	8.18	8.73	2.31	1.81	0.16			1.24	0.21	trace		100.24	
A1. I	.862	.149	018	.119	.205	.155	.037	.020				.015	.002		—		

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 8.9 ab 19.9 an 26.7 ne 2.6	di 16.0 ol 9.4 mt 4.8 il 8.0 ap 1.6	Locke's Hill, Mount Belknap, New Hampshire.	H. S. Washington.	Not published.	Hornblende-gabbro.	
Cl trace S 0.18 NiO trace CuO none	or 12.8 ab 21.0 an 19.2 ne 2.8	di 16.9 ol 6.8 mt 5.8 il 8.3 ap 2.5	Mount Gunstock, Mount Belknap, New Hampshire.	H. S. Washington.	Not published.	Camptonite.	Not fresh.
SO_3 none Cl 0.10 F 0.05 FeS_2 0.36 NiO 0.03	or 11.1 ab 24.6 an 20.3	di 15.1 hy 9.2 ol 6.4 mt 3.5 il 5.4 ap 1.3	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 70, 1897.	Camptonite.	
	or 6.7 ab 22.0 an 24.5	di 19.3 hy 7.3 ol 8.6 mt 4.9 il 6.3	Rockport, Cape Ann, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 289, 1899.	Diabase.	
	or 5.6 ab 34.1 an 20.0	di 13.5 hy 14.6 ol 6.2 mt 3.5	Middlefield, Connecticut.	J. H. Pratt.	H. E. Gregory, B. U. S. G. S., 165, p. 176, 1900.	Diabase.	
S 0.14 Cr_2O_3 trace NiO 0.02 SrO trace Li_2O trace	or 7.2 ab 26.2 an 22.0	di 12.5 hy 8.1 ol 12.8 mt 2.3 il 6.4 ap 1.3	Elizabethtown, Essex County, New York.	W. F. Hillebrand.	J. F. Kemp, B. U. S. G. S., 168, p. 37, 1900.	Norite.	
S 0.11 Cr_2O_3 trace NiO 0.03 SrO trace Li_2O trace	or 5.0 ab 26.2 an 25.0 ne 3.1	di 14.9 ol 15.9 mt 3.2 il 4.9	Elizabethtown, Essex County, New York.	W. F. Hillebrand.	J. F. Kemp, B. U. S. G. S., 168, p. 37, 1900.	Norite.	Derived from No. 9, auvergnose by pressure.
S 0.26 NiO trace	or 5.6 ab 21.0 an 19.5	di 25.9 hy 4.0 ol 5.9 mt 6.7 il 9.9	Lincoln Pond, Essex County, New York.	G. Steiger.	J. F. Kemp, 19 A. R. U. S. G. S., III, p. 407, 1899.	Gabbro.	
	or 6.1 ab 24.6 an 25.3	di 18.7 hy 12.8 ol 5.9 mt 4.2 il 2.9	Rocky Hill, New Jersey.	A. H. Phillips.	A. H. Phillips, A. J. S., VIII, p. 279, 1899.	Basalt.	Sum high.
FeS_2 0.13 Cr_2O_3 0.01 V_2O_3 0.03 NiO 0.03 SrO 0.02 Li_2O trace	or 11.1 ab 24.6 an 21.4	di 7.9 hy 17.3 ol 4.5 mt 3.5 il 6.2 ap 1.0	Limestone Cove, Unicoi County, Tennessee.	W. F. Hillebrand.	A. Keith, B. U. S. G. S., 168, p. 59, 1900.	Gabbro.	
SO_3 0.06 SrO 0.09	or 7.8 ab 23.6 an 26.7	di 3.2 hy 26.4 ol 1.7 mt 3.7 il 2.4	Marquette district, Michigan.	G. Steiger.	C. R. Van Hise, B. U. S. G. S., 148, p. 98, 1897.	Altered greenstone (diabase).	Not described.
SrO none	or 6.1 ab 26.2 an 24.5	di 5.2 hy 19.5 ol 1.7 mt 9.7 il 3.2	Duluth, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 293, 1900.	Orthoclase-gabbro.	
FeS_2 0.24 NiO trace SrO trace Li_2O trace Cu trace	Q 6.2 or 8.3 ab 20.4 an 23.9 C 1.7	hy 22.8 mt 6.0 il 2.9	Black Jack Mine, Silver City, Idaho.	W. F. Hillebrand.	W. Lindgren, 20 A. R. U. S. G. S., III, p. 176, 1900.	Diabasic basalt.	Not fresh.
	Q 0.1 or 11.7 ab 25.7 an 24.5	di 15.6 hy 16.5 mt 4.6 il 1.2	Hurricane Ridge, Crandall Basin, Yell. Nat. Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 260, 1899.	Mica-gabbro-porphyry.	Near andose.
	or 12.2 ab 23.6 an 22.8	di 17.6 hy 10.4 ol 5.9 mt 5.3 il 1.5	Hurricane Ridge, Crandall Basin, Yell. Nat. Park.	L. G. Eakins.	J. P. Iddings, M. U. S. G. S., XXXII, p. 260, 1899.	Gabbro-porphyry.	
Cl trace S 0.09	or 11.1 ab 19.4 an 25.6	di 14.3 hy 20.8 ol 3.6 mt 3.0 il 2.3	Dunraven Peak, Yellowstone National Park.	F. A. Gooch.	J. P. Iddings, B. U. S. G. S., 148, p. 135, 1897.	Basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
17	50.72	16.01	4.35	4.20	7.06	9.02	2.92	1.13	2.14	0.40	0.85	1.08	0.29	0.07	0.11	100.44	
A1. I	.845	.157	.027	.058	.187	.160	.047	.012				.013	.002	.001	.001		
18	47.28	11.56	3.52	5.71	13.17	9.20	2.73	2.17	2.96			0.88	0.59	0.13		100.08	
A2. II	.788	.113	.022	.079	.329	.164	.043	.023				.011	.004	.002			
19	48.35	15.47	4.80	7.58	8.15	8.81	3.09	0.95	0.73	0.28		1.33	0.33	0.21	0.06	100.26	2.970
A1. I	.806	.152	.030	.106	.204	.157	.050	.010				.016	.002	.003	—		21°.5
20	43.98	13.30	3.67	6.92	7.03	10.66	2.15	1.64	1.52	0.42	6.46	1.18	0.32	0.22	0.06	100.15	2.912
A1. I	.733	.130	.023	.096	.176	.190	.035	.017				.015	.002	.003	—		19°.5
21	54.56	16.04	0.95	6.07	8.71	8.89	3.05	1.18	0.28	——		0.53	0.18	0.17	0.03	100.38	
A1. I	.909	.157	.006	.085	.218	.159	.049	.013				.007	.001	.002	—		
22	53.46	14.81	2.60	5.15	7.27	8.44	2.60	1.30	2.13	0.12	0.44	0.70	0.16	0.18	0.05	99.76	
A1. I	.891	.145	.016	.072	.182	.150	.042	.014				.009	.001	.003	—		
23	51.27	12.14	2.51	6.71	10.88	10.32	2.00	1.63	1.16	0.17		0.60	0.21	0.21	0.07	99.92	
A1. I	.855	.119	.015	.093	.272	.184	.032	.017				.008	.002	.003	.001		
24	54.64	12.09	1.81	5.03	11.86	7.74	2.35	1.01	2.44	0.12	none	0.61	trace	0.13	0.05	100.01	
A1. I	.911	.119	.011	.070	.297	.138	.038	.011				.008	—	.002	—		
25	50.66	13.97	2.55	10.20	4.45	8.08	3.32	1.95	0.43	0.27	none	2.39	1.01	0.29	0.22	99.81	
A1. I	.844	.137	.016	.141	.111	.144	.053	.020				.030	.007	.004	.002		
26	47.91	14.26	1.65	7.80	10.83	9.60	3.01	1.89	0.37			2.70		trace		100.02	
A2. II	.799	.140	.010	.108	.271	.171	.048	.020				.034		—			
27	45.30	14.95	1.98	9.32	8.29	8.87	4.27	1.27	0.85			2.66	2.23	trace		99.99	
A2. II	.755	.147	.012	.129	.207	.159	.069	.013				.033	.015	—			
28	49.83	15.11	9.78	2.57	7.55	8.92	2.84	1.32	1.00	——	0.09	0.16	0.17	0.05	none	100.11	
A1. I	.831	.148	.061	.036	.189	.159	.045	.014				.002	.001	.001	—		
29	49.12	13.82	6.76	12.53	3.19	8.70	2.49	1.26	0.78			0.80		0.08		99.53	
A2. II	.819	.185	.042	.174	.080	.155	.040	.014				.010		.001			
30	52.47	12.15	3.47	5.23	9.94	9.71	2.81	2.26	1.62		0.54					100.20	
A3. III	.875	.119	.022	.072	.249	.173	.045	.024									
31	47.45	14.83	2.47	14.71	5.00	8.87	2.97	0.99	1.00		0.36	1.47				100.12	
A3. III	.791	.145	.015	.204	.125	.159	.048	.011				0.18					
32	51.22	14.06	4.32	8.73	4.42	8.33	2.55	1.25	1.28	——	0.19	2.42	0.25	0.16		99.67	2.98
A2. II	.854	.138	.027	.121	.111	.148	.042	.014				.030	.002	.002			
33	50.71	14.78	3.52	8.95	5.90	8.21	2.76	1.39	1.78	——	0.25	1.92		0.31		100.48	2.944
A2. II	.845	.145	.022	.125	.148	.146	.044	.015				.023		.004			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cr_2O_3 NiO SrO Li_2O	none none 0.09 trace	Q 1.7 or 6.7 ab 24.6 an 27.2	di 14.0 hy 14.3 mt 6.3 il 2.0	Eagle Creek, Yellowstone National Park.	H. N. Stokes.	Hague and Jaggar, B. U. S. G. S., 168, p. 97, 1900.	Hornblende-pyroxene-andesite.	
Cl	0.18	or 12.8 ab 15.2 an 19.5 ne 4.0	di 17.9 ol 21.8 mt 5.1 il 1.7 ap 1.4	Ishawooa Canyon, Wyoming.	J. E. Whitfield.	A. Hague, A. J. S., XXXVIII, p. 46, 1889.	Leucite-phonolite.	Leucite-absarokite, in J. P. Iddings, J.G., III, p. 938, 1895.
ZrO_2 SO_3 S Cr_2O_3 NiO SrO	none 0.07 trace trace 0.02 0.03	or 5.6 ab 26.2 an 25.6	di 14.7 hy 6.7 ol 10.5 mt 7.0 il 2.5	San Rafael Flow, Colfax County, New Mexico.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 171, 1900.	Plagioclase-basalt.	
FeS_2 NiO SrO Li_2O	0.54 0.03 0.05 trace	or 9.5 ab 15.7 an 21.7 ne 1.4	di 25.5 ol 9.3 mt 5.3 il 2.3	Indian Trail Ridge, La Plata Mountains, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 163, 1900.	Camptonite.	Not fresh.
Cr_2O_3 SrO Li_2O	trace trace trace	or 7.2 ab 25.7 an 26.4	di 14.4 hy 22.9 ol 1.3 mt 1.4 il 1.1	Cinder Cone, California.	W. F. Hillebrand.	J. S. Diller, B. U. S. G. S., 79, p. 29, 1891.	Quartz-basalt.	Dried at 105°.
FeS_2 NiO SrO Li_2O	0.26 0.05 trace trace	Q 5.2 or 7.8 ab 22.0 an 24.7	di 13.9 hy 17.7 mt 3.7 il 1.3	Near Sonora, Tuolumne County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 731, 1896.	Diorite.	Near andose.
NiO SrO Li_2O	0.04 trace? trace	or 9.5 ab 16.8 an 19.5	di 25.4 hy 16.5 ol 5.7 mt 3.5 il 1.2	Milton, Sierra County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 734, 1896.	Diabase-porphyry.	
NiO SrO Li_2O	0.05 trace trace	Q 3.6 or 6.1 ab 19.9 an 19.5	di 15.3 hy 29.3 mt 2.6 il 1.2	Near Table Mountain, Butte County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 731, 1896.	Quartz-diorite.	
Cl NiO SrO Li_2O	0.02 trace trace trace	or 11.7 ab 27.8 an 17.5	di 14.0 hy 17.9 mt 3.7 il 4.6 ap 2.2	Oroville, Table Mountain, Butte County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 491, 1894.	Basalt.	
Li_2O	trace	or 11.1 ab 15.2 an 22.8 ne 5.4	di 19.9 ol 18.7 mt 2.3 il 5.3	American Flat Creek, Washoe, Nevada.	S. L. Penfield.	Hague and Iddings, B. U. S. G. S., 17, p. 33, 1885.	Basalt.	
		or 7.2 ab 25.2 an 20.9 ne 6.0	di 7.7 ol 20.4 mt 2.8 il 5.1 ap 5.0	Near Mount Trumbull, Arizona.	L. G. Eakins.	B. U. S. G. S., 148, p. 188, 1897.	Lava.	Not described.
ZrO_2 Cl S CoO Cu Pb	none 0.02 none 0.64 0.05 0.01	Q 2.3 or 7.8 ab 23.6 an 25.0	di 15.0 hy 12.0 mt 8.4 hm 4.0	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Priv. contrib.	Epidiorite.	"Altered gabbro."
		Q 3.4 or 7.8 ab 21.0 an 22.5	di 17.4 hy 15.4 mt 9.7 il 1.5	Cape Weissenfels, King Charles Land, Spitzbergen.	N. Sahlbom.	A. Hamberg, G. F. F., XXI, p. 523, 1899.	Basalt.	
		or 13.3 ab 23.6 an 13.9	di 28.2 hy 5.4 ol 8.6 mt 5.1	Inchnadampf, Assynt, Scotland.	J. J. H. Teall.	J. J. H. Teall, G. M., XXIII, p. 350, 1886.	Diorite.	"Plagioclase-pyroxene-hornblende rock."
		or 6.1 ab 25.2 an 23.9	di 17.1 hy 1.8 ol 18.4 mt 3.5 il 2.8	Scourie, Sutherlandshire, Scotland.	J. J. H. Teall.	J. J. H. Teall, Q. J. G. S., XLI, p. 155, 1885.	Dolerite.	
FeS_2	0.49	Q 6.8 or 7.8 ab 22.0 an 22.8	di 14.9 hy 12.3 mt 6.3 il 4.6	Whin Sill, Durham, England.	J. J. H. Teall.	J. J. H. Teall, Q. J. G. S., XL, p. 654, 1884.	Diabase.	Dried at 110°.
		Q 1.9 or 8.3 ab 23.1 an 23.9	di 13.7 hy 18.7 mt 5.1 il 3.5	Whin Sill, Northumberland, England.	J. J. H. Teall.	J. J. H. Teall, Q. J. G. S., XL, p. 654, 1884.	Diabase.	Dried at 110°.

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
34	47.90	16.55	5.67	7.50	4.44	9.35	3.23	2.08	0.20			1.91	0.32	0.60		99.75	
A3. III	.798	.162	.035	.104	.111	.167	.045	.022				.023	.002	.009			
35	45.55	15.40	2.43	9.12	5.20	7.70	4.54	2.04	2.35		2.15	4.45				100.93	
B2. III	.759	.151	.015	.127	.130	.137	.063	.022				.056					
36	44.22	12.73	5.68	5.18	6.98	11.57	2.12	1.71	2.74		3.66	2.50	1.05	0.45		100.59	
A2. II	.737	.125	.036	.072	.175	.207	.034	.018				.031	.008	.006			
37	51.23	12.70	4.00	10.48	6.51	8.40	3.04	1.55	0.39			1.21	0.19	trace		99.70	
A2. II	.854	.124	.025	.146	.163	.150	.049	.017				.015	.001	—			
38	50.15	15.02	5.17	5.17	6.90	8.25	2.59	1.33	4.08		0.32	0.33	0.26			99.66	2.753
A2. II	.836	.147	.032	.072	.173	.147	.042	.014				.004	.002				
39	47.67	14.83	5.01	6.34	5.50	9.31	3.49	1.57	1.91		0.83	2.56	0.20	0.08		100.16	2.994
A1. I	.795	.145	.031	.088	.138	.166	.056	.017				.032	.001	.001			26°
40	46.19	1[illegible]	3.28	7.81	11.65	8.53	3.05	2.02	2.63		0.18	2.01	1.03			100.53	2.92
A2. II	.770	.119	.021	.108	.291	.151	.049	.021				.025	.007				
41	48.89	13.66	3.64	7.44	8.83	8.68	3.14	1.20	2.59			1.76	0.39			100.29	2.876
A2. II	.815	.134	.022	.103	.221	.155	.050	.013				.022	.003				
42	50.22	15.31	4.87	6.54	7.13	8.72	3.02	1.68	2.78				0.54			100.91	
A3. III	.837	.150	.030	.091	.178	.155	.048	.018					.004				
43	49.56	16.32	3.69	6.97	7.50	8.83	2.91	1.87	2.36							100.08	2.88
A3. III	.826	.160	.023	.097	.188	.157	.047	.020									
44	49.97	16.38	3.62	6.76	7.50	8.95	3.22	1.55	2.18							100.19	2.84
A3. III	.833	.160	.022	.094	.188	.160	.052	.017									
45	49.55	14.97	4.78	6.90	7.36	8.57	3.47	2.27	2.09							99.96	2.91
A3. III	.826	.146	.030	.096	.184	.153	.056	.024									
46	49.08	13.43	6.49	5.92	9.58	8.92	3.42	1.00	0.32	—		1.82	0.51			100.49	
A2. II	.818	.132	.040	.082	.240	.159	.055	.011				.023	.004				
47	48.39	12.07	8.23	7.82	8.48	8.81	2.67	0.90	1.81		0.36	0.25	0.97			100.76	
A2. II	.807	.118	.051	.108	.212	.157	.043	.010				.003	.007				
48	48.41	16.24	4.89	6.41	7.25	9.38	3.23	2.33	2.11			trace				100.25	
A3. III	.807	.159	.031	.089	.181	.168	.051	.024				—					
49	54.73	14.02	2.34	4.92	7.40	10.20	2.98	2.67	1.23			trace	trace			100.49	
A3. III	.912	.137	.014	.068	.185	.182	.048	.028				—	—				
50	45.75	15.85	7.40	5.82	6.90	7.20	3.44	1.33	3.20			1.68	0.55	0.31		99.61	
A2. II	.763	.155	.046	.080	.173	.128	.055	.014				.021	.004	.004			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 12.2 ab 23.6 an 26.4	di 16.7 hy 4.2 ol 3.4 mt 8.1 il 3.5	Tofteholmen, Christiania Fjord, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 83, 1899.	Essexite.	
		or 12.2 ab 22.0 an 18.3 ne 6.0	di 16.3 ol 9.1 mt 3.5 il 8.6	Hvinden, Gran, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 60, 1899.	Camptonite.	Not fresh.
		or 10.0 ab 17.8 an 20.3	di 24.0 hy 4.7 ol 3.1 mt 8.4 il 4.8 ap 2.5	Kjöse-Aklungen, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 51, 1899.	Camptonite.	Not fresh.
		or 9.5 ab 25.7 an 16.1	di 21.0 hy 15.3 ol 3.5 mt 5.8 il 2.3	Halleborg, Sweden.	A. Merian.	A. Merian, N. J. B. B., III, p. 289, 1885.	Diabase.	
SO_3	0.09	Q 3.2 or 7.8 ab 22.0 an 25.3	di 12.4 hy 16.2 mt 7.4 il 0.6	Höringen, Pfalz.	K. Klüss.	A. Leppla, Jb. Pr. G. L.-A., XIV, p. 150, 1894.	Melaphyre.	
X SO_3 Cl	0.66 0.05 0.15	or 9.5 ab 28.3 an 20.0 ne 0.6	di 20.7 ol 5.5 mt 7.2 il 4.8	Hirzstein, Habichtswald, Nassau.	O. Fromm.	O. Fromm, Z. D. G. G., XLIII, p. 70, 1891.	Basalt.	SO_3 for S?
SO_3	trace	or 11.7 ab 19.9 an 13.6 ne 3.1	di 17.7 ol 20.9 mt 4.9 il 3.7 ap 2.3	Breitenberg, Bl. Altmorschen, Prussia.	Not stated.	F. Beyschlag, Erl. G. Kt. Preuss., Bl. Altmorschen, p. 24, 1891.	Basalt.	
SO_3	0.07	or 7.2 ab 26.2 an 19.7	di 16.5 hy 7.3 ol 12.1 mt 5.1 il 3.4 ap 1.0	Gangölfsberg, Rhöngebirge.	Haefcke.	H. Proescholdt, Jb. Pr. G. L.-A., XIV, p. 12, 1894.	Dolerite.	SO_3 for S.
Cl	0.10	or 10.0 ab 25.2 an 23.4	di 13.1 hy 14.4 ol 3.8 mt 7.0 ap 1.3	Eisenberg, Hesse.	H. Wolff.	K. Oebbeke, Jb. Pr. G. L.-A., IX, p. 395, 1889.	Basalt.	
Cl	0.07	or 11.1 ab 24.6 an 25.9	di 14.6 hy 2.4 ol 13.8 mt 5.3	Eisenberg, Hesse.	H. Wolff.	K. Oebbeke, Jb. Pr. G. L.-A., IX, p. 394, 1889.	Basalt.	
Cl	0.06	or 9.5 ab 27.2 an 25.3	di 15.8 hy 0.8 ol 14.4 mt 5.1	Krötenkopf, Hesse.	H. Wolff.	K. Oebbeke, Jb. Pr. G. L.-A., IX, p. 393, 1889.	Basalt.	
		or 13.3 ab 24.1 an 18.3 ne 2.8	di 19.5 ol 12.9 mt 7.0	Hohebaum, Lottersberg, Hesse.	H. Wolff.	K. Oebbeke, Jb. Pr. G. L.-A., IX, p. 397, 1889.	Basalt.	
		or 6.1 ab 28.8 an 18.3	di 17.6 hy 8.3 ol 7.0 mt 9.3 il 3.5 ap 1.3	Londorf, Vogelsberg, Hesse.	A. Streng.	A. Streng, N. J., 1888, II, p. 211.	Dolerite.	Dried at 100°.
		Q 1.3 or 5.6 ab 22.5 an 18.1	di 15.7 hy 21.0 mt 11.8 ap 2.3	Laubach, Vogelsberg, Hesse.	J. M. Ledroit.	J. M. Ledroit, Ber. Oberh. Ges., XXIV, p. 151, 1886.	Basalt.	
		or 13.3 ab 19.4 an 23.3 ne 4.0	di 19.3 ol 11.7 mt 7.2	Der Sabbel, Hesse.	Krauss.	K. Oebbeke, Jb. Pr. G. L-A., IX, p. 410, 1889.	Nephelite-basanite.	
		or 15.6 ab 25.2 an 17.0	di 27.0 hy 12.2 mt 3.2	Topla, S. Carinthia.	H. V. Graber.	H. V. Graber, Jb. G. R-A. Wien., XLVII, p. 278, 1897.	Basic concretion in granite.	Near kentallenose.
S	0.18	or 7.8 ab 28.8 an 23.8	di 6.9 hy 7.7 ol 5.6 mt 10.7 il 3.3 ap 1.3	Steinberg, Salzkammergut, Tyrol.	C. v. John.	C. v. John, Jb. G. R-A. Wien., XLIX, p. 252, 1899.	Gabbro.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
51	53.04	13.06	8.19	2.40	5.17	10.61	3.27	2.06	2.21				0.56	0.16		100.73	
A3. III	.884	.128	.051	.033	.129	.189	.057	.022					.004	.002			
52	48.64	11.68	10.57	6.31	6.78	10.88	2.90	1.01	1.02					0.39		100.18	
A3. III	.811	.115	.066	.088	.170	.194	.047	.011						.006			
53	49.97	14.22	8.14	3.79	4.14	11.21	2.79	2.39	3.50					trace		100.15	2.976
A3. III	.833	.139	.051	.053	.104	.200	.045	.025						—			
54	47.73	13.33	0.68	14.99	5.63	7.41	2.77	1.17	—	0.11		4.04	0.61	0.30		99.13	
B2. III	.796	.131	.004	.208	.141	.132	.045	.012				.050	.004	.004			
55	47.34	14.03	0.80	17.20	2.24	6.89	2.74	2.34	—	0.05		4.17	1.07	0.21		99.48	
A2. II	.789	.137	.005	.239	.056	.123	.044	.025				.052	.008	.003			
56	46.30	13.44	4.11	12.61	4.42	11.88	2.13	1.94	3.02				0.59	0.22		100.92	2.401
B2. III	.772	.132	.026	.175	.111	.212	.034	.020					.004	.003			11°
57	51.68	13.88	6.59	4.44	7.87	10.99	2.93	0.81	0.74							99.93	
A3. III	.861	1.36	.041	.061	.197	.196	.047	.009									
58	49.80	13.76	3.09	11.97	5.02	10.25	3.00	1.15	trace			0.95	0.22	0.10		99.31	
B2. III	.830	.135	.020	.167	.125	.183	.048	.013				.012	.002	.001			
59	48.04	14.62	9.18	11.68	2.17	7.66	4.00	1.28	none			trace	0.45	1.91		100.99	2.78
B2. III	.801	.143	.057	.162	.054	.136	.064	.014				—	.003	.027			
60	47.61	16.09	7.00	10.60	3.10	8.15	2.98	1.15	0.70			0.39	trace	1.72		99.49	2.93
B2. III	.794	.157	.044	.147	.078	.145	.048	.013				.005	—	.024			
61	45.79	15.09	5.34	5.58	5.92	10.21	3.67	0.90	n. d.			3.25	0.29	0.49		99.25	
B1. II	.797	.148	.033	.078	.148	.182	.059	.010				.041	.002	.007			
62	43.70	14.98	5.38	5.44	7.45	9.64	3.02	2.38	5.27		trace	2.15	0.66	0.06		100.24	2.98
A1. I	.728	.147	.034	.075	.186	.172	.048	.025				.026	.005	.001			
63	50.22	16.20	3.13	8.07	7.54	8.57	3.36	1.38	0.22			1.95		trace		100.64	2.79
A2. II	.837	.158	.020	.112	.189	.153	.054	.015				.024		—			
64	48.97	16.12	1.90	9.63	7.64	8.73	2.99	1.21	1.39			1.62		trace		100.20	2.89
A2. II	.816	.158	.012	.134	1.91	1.55	.048	.013				.020		—			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE—Continued.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 3.5 or 12.3 ab 29.9 an 13.6	di 27.4 mt 7.7 hm 2.9 ap 1.4	Punta Luccia, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 102, 1892.	Basalt.	
	Q 1.4 or 6.1 ab 24.6 an 15.6	di 30.4 hy 5.6 mt 15.3	Pikonkorpi, Kalvola, Finland.	A. W. Forsberg.	J. J. Sederholm, Finl. G. Und., Bl. 18, p. 49, 1890.	Uralite-porphyrite.	"Basalt" in T. M. P. M., XII, p. 107, 1891.
	Q 2.3 or 13.9 ab 23.6 an 19.2	di 23.0 wo 2.9 mt 11.8	Jalguba, Olonez, Russia.	Loewinson-Lessing.	Loewinson-Lessing, T. M. P. M., VI, p. 294, 1885.	Variolite-aphanite.	
Cl 0.10 S 0.26	or 6.7 ab 23.6 an 20.6	di 10.5 hy 21.1 ol 6.3 mt 0.9 il 7.7 ap 1.4	Goroschki, Volhynia, Russia.	W. Tarassenko.	W. Tarassenko, cf. N. J., 1899, I, p. 463.	Olivine-gabbro.	Sum low, due to H_2O+. "H_2O+" increase.
Cl 0.10 S 0.30	or 13.9 ab 23.1 an 18.9	di 6.8 hy 19.2 ol 5.4 mt 1.2 il 7.9 ap 2.6	Goroschki, Volhynia, Russia.	W. Tarassenko.	W. Tarassenko, cf. N. J., 1899, I, p. 463.	Olivine-pyroxene-syenite.	Sum low, due to H_2O+. "H_2O+" increase.
Cr_2O_3 0.26	or 11.1 ab 14.7 an 21.7 ne 1.7	di 27.7 ol 13.3 mt 5.8 ap 1.4	Assab, Massowa, Abyssinia.	L. Ricciardi.	L. Ricciardi, B. S. G. It., V, p. 58, 1886.	Basalt.	Sum high. Sp. gr. low. Near kentallenose.
	Q 1.9 or 5.0 ab 24.6 an 22.2	di 25.3 hy 10.4 mt 9.5	Colesburg, Cape Colony.	Gridmore and Halberstadt.	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine-diabase.	
	or 7.2 ab 25.2 an 20.6	di 25.4 hy 5.3 ol 9.2 mt 4.6 il 1.8	Kilauea, Hawaii.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 141, 1888.	Basalt.	Sum low.
	or 7.8 ab 33.5 an 18.1	di 14.6 hy 7.7 ol 3.1 mt 13.2 ap 1.0	Kilauea, Hawaii.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 175, 1888.	Basalt.	Sum high. MnO high.
	or 7.2 ab 25.2 an 26.7	di 11.5 hy 15.0 mt 10.2 il 0.8	Kilauea, Hawaii.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 183, 1888.	Basalt.	MnO high.
SO_3 2.54 CuO 0.18	or 5.6 ab 30.1 an 22.0 ne 0.4	di 22.5 ol 3.5 mt 7.7 il 6.3	Kilauea, Hawaii.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt (Pele's hair).	Ignited before analysis. SO_3 from fumarole action.
SO_3 0.11 CuO trace	or 13.9 ab 14.7 an 20.6 ne 5.7	di 17.7 ol 8.7 mt 7.9 il 4.0 ap 1.7	Mas River, Timor Island, Dutch East Indies.	O. Pufahl.	A. Wichmann, Gest. v. Timor, Leiden, 1887, p. 128.	Basalt.	
	or 8.3 ab 28.9 an 24.7	di 14.4 hy 4.4 ol 12.1 mt 4.6 il 3.7	Cockburn Island, Antarctic.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 89, 1899.	Basalt glass.	
	or 7.2 ab 25.2 an 27.0	di 13.3 hy 5.0 ol 15.5 mt 2.8 il 3.1	Cockburn Island, Antarctic.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 89, 1899.	Basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	42.25	16.87	5.24	10.72	6.91	3.33	3.96	0.77	5.58	0.43	none	2.93	0.34	0.40	trace?	99.84	
A1. I	7.04	1.65	.032	.149	.168	.059	.059	.008				.035	.002	.006	—		
2	50.76	12.83	4.98	10.09	6.67	9.88	3.52	0.62	0.87							100.22	
A3. III	.846	.126	.031	.140	.167	.177	0.56	.006									
3	51.08	15.55	7.71	8.55	4.48	9.00	3.29	0.53	n. d.				0.04			100.23	
A3. III	.851	.151	.049	.119	.112	.160	.053	.006					—				
4	51.07	14.93	6.44	5.98	4.84	7.89	5.04	0.16	1.73	0.24		1.65	0.19	0.22		100.38	
A1. I	.851	.146	.040	.083	.121	.141	.081	.002				.021	.001	.003			
5	51.01	11.89	1.57	6.08	8.87	10.36	4.17	0.15	2.09	0.24		0.98	0.17	trace		99.35	
B1. II	.850	.117	.010	.085	.222	.185	.068	.002				.012	.001	—			
6	51.58	14.99	2.04	8.36	6.51	8.59	3.08	0.31	2.67	0.34		1.05	0.24	trace		99.76	
A2. II	.860	.147	.013	.117	.163	.153	.050	.003				.013	.002	—			
7	51.28	15.05	2.42	8.01	6.07	7.08	4.43	0.12	2.96	0.39		1.33	0.13	0.25		99.62	
A2. II	.855	.11	.015	.111	.152	.127	.071	.001				.017	.001	.004			
8	49.08	14.68	1.95	9.63	6.69	10.09	4.60	0.20	1.18	0.28		1.72	0.23	0.15		100.48	
A2. II	.818	.144	.012	.134	.167	.180	.074	.002				.021	.002	.002			
9	46.11	15.97	3.31	9.16	8.35	8.49	3.42	0.63	1.99			0.54	0.47	0.65		99.09 (99.10)	
B2. III	.769	.156	.021	.127	.209	.151	.055	.006				.007	.003	.009			
10	52.73	14.35	4.37	7.60	5.13	7.26	3.57	0.82	1.33		0.22	2.34	0.46	trace	trace	100.18	2.872
A2. II	.846	.141	.027	.106	.128	.129	.058	.009				.029	.003	—	—		15°
11	51.82	11.66	4.39	5.46	7.02	12.65	3.38	0.32	1.25		1.01	0.44				100.72	3.008
A2. II	.864	.114	.027	.076	.175	.226	.055	.003				.006					
12	44.64	13.97	5.69	5.75	9.78	11.50	2.99	0.43	4.22			1.80				100.77	
A3. III	.744	.137	.035	.080	.245	.205	.048	.004				.022					
13	53.52	13.56	4.93	6.61	7.37	7.39	3.22	0.68	1.03			1.84				100.05	
A3. III	.892	.133	.031	.092	.184	.132	.051	.007				.023					
14	41.32	12.27	15.13	7.36	3.56	10.33	4.19	0.85	4.38		0.20	0.35	0.97			100.91	
B2. III	.689	.120	.094	.102	.089	.184	.068	.009				.004	.007				
15	47.98	12.52	8.07	7.09	7.41	10.56	3.58	0.58				trace	1.95	0.33		100.07	2.75
A2. II	.800	.123	.050	.099	.185	.188	.058	.006				—	.014	.005			20°
16	47.53	12.35	8.32	7.15	7.18	11.54	3.60	none				0.04	1.98	0.28		99.97	3.11
A2. II	.792	.121	.052	.100	.180	.206	.058	—				—	.014	.004			23°
17	47.51	12.53	8.08	7.05	8.40	10.05	3.85	none				0.03	2.05	0.28		99.83	3.02
A2. II	.792	.123	.050	.098	.210	.179	.062	—				—	.015	.004			20°

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 5. PERSODIC. ORNOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 S Cr_2O_3 V_2O_3 NiO SrO	none trace 0.03 0.07 0.01 none	or 4.4 ab 33.5 an 16.4 C 3.5	hy 2.6 ol 21.8 mt 7.4 il 5.4	Mars Hill, Aroostook County, Maine.	W. F. Hillebrand.	H. E. Gregory, B. U. S. G. S., 165, p. 179, 1900.	Diabase glass.	
		or 3.3 ab 29.3 an 17.8	di 25.9 hy 8.5 ol 7.3 mt 7.2	Little John Island, Portland, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXII, p. 341, 1898.	Diabase-porphyry.	
		Q 3.7 or 3.3 ab 27.8 an 25.9	di 15.5 hy 12.8 mt 11.4	The Dalles, Columbia River, Oregon.	H. W. Muthmann.	K. Oebbeke, N. J., 1885, I, p. 226.	Basalt.	
SO_3 Cl F	trace trace trace	or 1.1 ab 42.4 an 17.5	di 17.7 hy 6.5 mt 9.3 il 3.2	Forbestown, Butte County, California.	H. N. Stokes.	H. W. Turner, 17 A. R. U. S. G. S., I, p. 731, 1896.	Uralite-diorite.	
FeS_2 CuS Cr_2O_3	1.73 trace 0.04	or 1.1 ab 34.1 an 13.1 ne 0.9	di 30.7 ol 11.4 mt 2.3 il 1.8 pr 1.7	Grass Valley, Nevada County, California.	H. N. Stokes.	W. Lindgren, 17 A. R. U. S. G. S., II, p. 66, 1896.	Diabase.	Sum low.
		Q 2.5 or 1.7 ab 26.2 an 26.1	di 13.6 hy 21.7 mt 3.0 il 2.0	Mitchell Canyon, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 412, 1891.	Diabase.	Not fresh.
NiO	0.10	or 0.6 ab 37.2 an 21.1	di 11,6 hy 17.4 ol 1.9 mt 3.5 il 2.6	Sulphur Bank, California.	W. H. Melville.	G. F. Becker, M. U. S. G. S., XIII, p. 99, 1888.	Pseudodiabase.	
		or 1.1 ab 28.8 an 18.9 ne 5.4	di 25.5 ol 12.9 mt 2.8 il 3.2	Mount St. Helena, California.	W. H. Melville.	G. F. Becker, M. U. S. G. S., XIII, p. 98, 1888.	Pseudodiabase.	
		or 3.3 ab 27.8 an 26.4 ne 0.6	di 10.6 ol 21.1 mt 4.1 il 1.1 ap 1.1	Ornö, Sweden.	R. Mauzelius.	A. Cederström, G. F. F., XV, p. 108, 1893.	Ornöite.	Sum low.
Cl F Cr_2O_3	trace trace trace	Q 4.3 or 5.0 ab 30.4 an 20.6	di 10.1 hy 14.6 mt 6.3 il 4.5 ap 1.1	Rüdigheim, Hanau, Rh. Prussia.	T. Petersen.	T. Petersen, cf. N. J., 1894, I, p. 460.	Basalt.	
S	0.32	Q 0.9 or 1.7 ab 28.8 an 15.6	di 37.8 hy 5.2 mt 6.3 il 0.9	Rauenthal, Taunus Mountains, Hesse-Nassau.	L. Milch.	L. Milch, Z. D. G. G., XLI, p. 430, 1889.	Diabase.	
		or 2.2 ab 18.3 an 23.6 ne 3.7	di 26.4 ol 10.6 mt 8.1 il 3.4	Albacher Hof, Giessen, Ober Hesse.	A. Streng.	A. Streng, Ber. Oberh. Ges., XXIX, p. 99, 1893.	Basalt.	
		Q 6.9 or 3.9 ab 26.3 an 20.9	di 12.7 hy 17.3 mt 7.2 il 3.5	Londorf, Vogelsberg, Hesse.	A. Streng.	A. Streng, N. J., 1888, II, p. 217.	Basalt-obsidian.	Nearly in Order 4.
		or 5.0 ab 26.2 an 12.0 ne 5.1	di 21.3 wo 2.5 mt 21.8 ap 2.3	Gedern, Vogelsberg, Hesse.	J. M. Ledroit.	J. M. Ledroit, Ber. Oberh. Ges. XXIV, p. 152, 1886.	Trachydolerite.	
		or 3.3 ab 30.4 an 16.4	di 18.5 hy 12.1 ol 3.0 mt 11.6 ap 4.6	Pianeti, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Soc. Alp. Trident, XIX, p. 407, 1894.	Basalt.	Dried before analysis. $H_2O=1.56$.
		ab 30.3 an 17.5	di 21.8 hy 12.4 ol 1.0 mt 12.1 ap 4.6	Pradaglia, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Soc. Alp. Trident, XIX, p. 409, 1894.	Basalt.	Dried before analysis. $H_2O=0.95$.
		ab 32.5 an 17.0	di 15.1 hy 14.1 ol 4.4 mt 11.6 ap 4.9	Manzano, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Soc. Alp. Trident, XIX, p. 410, 1894.	Basalt.	Dried before analysis. $H_2O=2.35$.

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
18	46.18	13.45	8.18	7.01	7.35	12.26	3.05	0.57				trace	1.56	0.31		99.92	3.01
A2. II	.770	.132	.051	.097	.184	.219	.049	.006				—	.011	.004			20°
19	45.76	13.50	8.43	6.96	7.38	12.19	3.09	0.55					1.72	0.35		99.93	3.05
A2 II	.763	.132	.052	.097	.185	.218	.050	.006					.012	.005			20°
20	51.63	12.10	8.67	3.10	9.40	9.17	3.10	0.30				2.47	0.26	0.30		101.08	
B1. II	.861	.119	.054	.043	.235	.163	.050	.003				.031	.002	.004			
21	49.88	13.79	9.65	2.61	6.12	9.59	3.30	0.17				3.97	0.26	0.67		100.26	
A1. I	.831	.135	.060	.036	.153	.171	.053	.002				.050	.002	.010			

RANG 4. DOCALCIC. AUVERGNASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	46.86	13.96	5.23	4.67	7.69	9.42	1.85	2.02	3.43	1.29	2.19	1.13	0.15	trace	0.03	99.92	
A1. I	.781	.137	.032	.065	.192	.168	.030	.021				.014	.001	—	—		
2	50.03	14.08	2.92	6.11	10.73	7.46	1.46	2.64	3.70			0.61	0.42	0.08	0.04	100.28	
A1. I	.834	.138	.018	.085	.268	.133	.023	.027				.008	.003	.001	—		
3	47.5	15.6	2.6	7.1	11.7	9.8	1.4	1.5	2.4							99.7	2.96
A3. III	.792	.153	.016	.099	.293	.175	.022	.016									
4	53.63	14.17	1.46	8.07	7.05	8.52	1.80	2.03	2.01				0.93	trace		100.29	2.789
B2. III	.894	.139	.009	.112	.176	.151	.029	.021					.006	—			6°

RANG 4. DOCALCIC. AUVERGNASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	47.20	18.64	1.96	6.82	8.28	11.52	2.91	0.28	1.44			0.84				99.89	2.02
A3. III	.787	.182	.013	.094	.207	.205	.047	.003				.010					
2	46.29	17.16	2.57	9.87	7.79	12.04	2.21	0.16	0.51			1.21				99.81	3.06
A3. III	.772	.168	.016	.138	.195	.215	.035	.002				.015					
3	45.66	16.26	2.97	8.51	10.21	12.25	1.34	0.31	0.92			1.39				99.82	3.04
A3. III	.761	.159	.019	.118	.255	.219	.021	.003				.017					
4	44.79	15.18	4.13	8.21	7.93	14.10	2.18	0.30	1.33			1.84				99.99	3.04
A3. III	.747	.148	.025	.114	.198	.251	.035	.003				.023					
5	49.63	14.40	2.85	8.06	7.25	9.28	2.47	0.70	1.47	0.27	1.36	1.68	0.25	0.17	trace?	100.17	
A1. I	.827	.141	.018	.112	.181	.166	.040	.008				.021	.002	.002	—		
6	46.59	17.55	1.68	10.46	7.76	10.64	3.31	0.72	0.07	0.10		1.41				100.29	3.047
A3. III	.777	.172	.011	.145	.194	.190	.053	.008				.017					11°
7	52.40	13.55	2.73	9.79	5.53	10.01	2.32	0.40	1.05	0.62		1.08	0.12	0.26	trace?	99.99	
A1. I	.873	.133	.017	.137	.138	.178	.037	.004				.014	.001	.004	—		

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 5. PERSODIC. ORNOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 3.3 ab 25.7 an 21.4	di 23.6 hy 2.6 ol 7.6 mt 11.8 ap 3.6	Valle del Parol, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Soc. Alp. Trident, XIX, p. 407, 1894.	Basalt.	Dried before analysis. $H_2O=1.27$.
		or 3.3 ab 26.2 an 21.1	di 22.7 hy 1.4 ol 8.7 mt 12.1 ap 4.0	Tierno, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Soc. Alp. Trident, XIX, p. 405, 1894.	Basalt.	Dried before analysis. $H_2O=1.34$.
SO_3 S Cr_2O_3 CuO	0.07 0.03 trace 0.48	Q 4.7 or 1.7 ab 26.2 an 18.3	di 21.0 hy 13.8 mt 3.0 il 4.8 hm 6.4	Waianae, Oahu, Hawaii.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Sum high. Dried before analysis. $H_2O+=0.33$. $H_2O-=0.47$.
SO_3 S Cr_2O_3 CuO	0.09 0.02 trace 0.14	Q 6.6 or 1.1 ab 27.8 an 22.2	di 16.9 hm 7.5 il 5.5 hn 9.7 pf 1.9	Koolan Range, Oahu, Hawaii.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Dried before analysis. $H_2O+=1.14$. $H_2O-=1.84$.

SUBRANG 2. SODIPOTASSIC.

F SrO Li_2O	trace trace trace	Q 0.5 or 11.7 ab 15.7 an 23.9	di 18.0 hy 13.3 mt 7.4 il 2.2	Meriden, Connecticut.	H. N. Stokes.	B. K. Emerson, B. G. S. A., VIII, p. 77, 1897.	Diabase pitchstone.	Not fresh. Near kentallenose. Also in M. U. S. G. S., XXIX, p. 437, 1898.
Cr_2O_3 NiO	trace trace	or 15.0 ab 12.1 an 24.5	di 10.2 hy 26.5 ol 2.2 mt 4.2 il 1.2 ap 1.0	South Boulder Creek, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 670, 1895.	Lamprophyre.	
Cr_2O_3	0.1	or 8.9 ab 11.5 an 32.0	di 13.5 hy 11.9 ol 15.8 mt 3.7	Ben Damhain, Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Biotite-diorite.	One decimal.
SO_3 Cl	0.62 trace	Q 5.6 or 11.7 ab 15.2 an 24.7	di 10.0 hy 27.3 mt 2.1 ap 1.9	Radicofani, Tuscany.	L. Ricciardi.	G. Mercalli, Att. Soc. Ital., Milano, XXX, p. 371, 1887.	Andesite.	

SUBRANG 3. PRESODIC. AUVERGNOSE.

		or 1.7 ab 21.5 an 36.7 ne 1.7	di 16.6 ol 15.9 mt 3.0 il 1.5	Green Point, Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXVI, p. 340, 1900.	Gabbro-diorite.	Sp. gr. 3.02? Near hessose. 6 specimens.
		or 1.1 ab 18.3 an 36.4	di 19.5 hy 2.4 ol 15.8 mt 3.7 il 2.2	Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXV, p. 346, 1900.	Beerbachite.	6 specimens.
		or 1.7 ab 11.0 an 37.5	di 19.3 hy 11.2 ol 11.2 mt 4.4 il 2.6	Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXVI, p. 346, 1900.	Malchite.	5 specimens.
		or 1.7 ab 12.6 an 30.6 ne 3.1	di 31.8 ol 9.5 mt 5.8 il 3.6	Seal Ledge, Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXVI, p. 340, 1900.	Hornblende-gabbro.	
SO_3 Cl F FeS_2 NiO	none 0.07 trace 0.22 0.04	Q 1.5 or 4.4 ab 21.0 an 25.9	di 16.6 hy 19.8 mt 4.2 il 3.2	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, B. U. S. G. S., 148, p. 70, 1897.	Diabase.	
		or 4.4 ab 16.8 an 30.9 ne 6.0	di 18.3 ol 18.8 mt 2.6 il 2.6	Salem Neck, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 285, 1899.	Camptonite.	
FeS_2 NiO SrO Li_2O	0.13 trace none none	Q 6.7 or 2.2 ab 19.4 an 25.6	di 19.7 hy 18.1 mt 3.9 il 2.2	Pine Hill, South Britain, Connecticut.	W. F. Hillebrand.	W. H. Hobbs, B. U. S. G. S., 168, p. 35, 1900.	Olivine-basalt.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
8	46.85	18.00	6.16	8.76	8.43	10.17	2.19	0.09	0.30							100.95	3.097
B3. IV	.781	.176	.039	.122	.211	.182	.035	.001									
9	44.97	15.38	2.29	12.39	10.89	7.50	3.02	0.56	0.65	0.10	0.23	1.18	0.14	0.22	trace?	99.64	
A1. I	.750	.150	.014	.172	.272	.134	.048	.006				.015	.001	.003	—		
10	51.36	16.25	2.14	8.24	7.97	10.27	1.54	1.06	1.33					0.09		100.28	
A8. III	.856	.159	.013	.114	.199	.184	.025	.011						.001			
11	51.68	15.87	1.46	8.43	7.84	11.08	1.86	0.34	0.15	0.16		0.72	0.12	0.15		99.86	
A2. II	.861	.155	.009	.117	.196	.198	.030	.003				.009	.001	.002			
12	48.02	17.50	1.80	7.83	10.21	13.16	1.48	trace	0.79							100.79	
B3. IV	.800	.171	.011	.108	.255	.235	.024	—									
13	46.85	19.72	3.22	7.99	7.75	13.10	1.56	0.09	0.56							100.84	
B3. IV	.781	.193	.020	.111	.194	.234	.025	.001									
14	46.68	17.12	2.18	7.61	10.34	13.46	1.75	trace	0.88				trace	trace		100.02	3.069
A3. III	.778	.168	0.14	.106	.259	.240	.028	—					—	—			
15	51.31	13.64	0.52	8.49	12.73	12.41	1.40	0.32	n. d.			trace	trace	trace		100.82	
B3. IV	.855	.134	.003	.118	.318	.221	.022	.003				—	—	—			
16	50.88	13.17	1.11	9.66	13.05	10.19	1.17	0.31	0.14					trace		99.67	
A3. III	.848	.129	.007	.135	.326	.182	.019	.003						—			
17	46.91	15.85	2.86	9.95	7.01	9.62	2.65	0.69	1.62	0.24		2.03	0.26	0.22	trace?	99.98	
A1. I	.782	.155	.018	.139	.175	.171	.043	.007				.025	.002	.003	—		
18	47.90	15.60	3.69	8.41	8.11	9.99	2.05	0.23	2.34	0.15	0.38	0.82	0.13	0.17	0.05	100.12	
A1. I	.798	.153	.023	.117	.203	.178	.033	.002				.010	.001	.002	—		
19	51.46	14.35	3.90	5.28	9.54	9.08	2.92	0.24	3.30	—	0.20					100.27	
A3. III	.858	.140	.024	.074	.239	.161	.047	.003									
20	48.23	18.26	1.26	6.10	10.84	9.39	1.34	0.73	2.00	0.26	0.43	1.00	0.07			99.91	
A2. II	.804	.179	.008	.085	.271	.168	.021	.007				.012	.001				
21	44.29	17.46	3.82	10.35	7.03	8.68	2.19	0.71	4.11	0.21		1.40	0.20	trace	none	100.45	
A2. II	.738	.171	.024	.144	.176	.155	.035	.008				.017	.001	—	—		
22	48.35	15.40	4.04	4.63	11.61	10.38	1.87	0.35	3.60	—	0.08					100.31	
A3. III	.806	.151	.025	.064	.290	.185	.030	.004									
23	47.96	16.85	4.33	4.17	9.15	13.25	1.25	0.30	2.89	—	0.08					100.23	
A3. III	.799	.165	.027	.058	.229	.236	.020	.003									
24	49.65	16.36	4.39	7.19	8.00	9.18	2.49	1.17	2.39							100.82	
B3. IV	.828	.160	.027	.100	.200	.164	.040	.013									
25	49.07	17.21	0.46	12.18	3.60	9.66	2.96	trace	1.55		2.70			trace		99.89	
A3. III	.818	.169	.003	.170	.090	.172	.048	—						—			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 3. PRESODIC. AUVERGNOSE—Continued.

Inclusive.	Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 0.6 ab 18.3 an 38.9	di 9.5 hy 16.6 ol 7.8 mt 9.0	Wilmurt Lake, Hamilton County, New York.	C. H. Smyth, jr.	C. H. Smyth, jr., A. J. S., XLVIII, p. 61, 1894.	Gabbro.	Sum high.
S 0.06 Cr_2O_3 trace V_2O_3 0.02 NiO 0.02 SrO trace Li_2O trace	or 3.3 ab 21.0 an 26.7 ne 2.3	di 8.7 ol 30.6 mt 3.2 il 2.3	Elizabethtown, Essex County, New York.	W. F. Hillebrand.	J. F. Kemp, B. U. S. G. S., 168, p. 37, 1900.	Diabasic norite.	
NiO 0.03	Q 2.0 or 6.1 ab 13.1 an 34.2	di 13.9 hy 26.5 mt 2.0	Watchung Mountain, Orange, New Jersey.	L. G. Eakins.	J. P. Iddings, B. U. S. G. S., 150, p. 255, 1898.	Basalt.	
	Q 2.9 or 1.7 ab 15.7 an 33.9	di 17.2 hy 24.3 mt 2.1 il 1.4	Rocky Ridge, Maryland.	E. A. Schneider.	J. S. Diller, B. U. S. G. S., 148, p. 90, 1897.	Diabase.	Not described.
	ab 12.6 an 40.9	di 20.0 hy 12.0 ol 11.9 mt 2.6	Baltimore area, Maryland.	L. McCay.	G. H. Williams, B. U. S. G. S., 28, p. 39, 1886.	Gabbro-diorite.	19 specimens.
	or 0.6 ab 13.1 an 43.9	di 17.3 hy 11.4 ol 8.4 mt 4.6	Baltimore area, Maryland.	L. McCay.	G. H. Williams, B. U. S. G. S., 28, p. 39, 1886.	Gabbro.	23 specimens.
	ab 14.7 an 38.9	di 22.6 hy 0.9 ol 18.9 mt 3.2	Windsor road, Baltimore, Maryland.	L. McCay	G. H. Williams, B. U. S. G. S., 28, p. 37, 1886.	Gabbro-diorite.	
	or 1.7 ab 11.5 an 30.3	di 25.1 hy 22.3 ol 9.0 mt 0.7	The Twins, Culpeper County, Virginia.	W. G. Brown.	Campbell & Brown, B. G. S. A., II, p. 346, 1891.	Hypersthene-diabase.	Sum high.
	or 1.7 ab 10.0 an 29.7	di 16.9 hy 35.4 ol 4.3 mt 1.6	The Twins, Culpeper County, Virginia.	W. G. Brown.	Campbell & Brown, B. G. S. A., II, p. 346, 1891.	Olivine-hypersthene-diabase.	
ZrO_2 none S none Cr_2O_3 0.01 V_2O_3 0.03 NiO 0.03 SrO trace?	or 3.9 ab 22.5 an 29.2	di 15.1 hy 8.1 ol 10.7 mt 4.2 il 3.8	Hump Mountain, Mitchell County, North Carolina.	W. F. Hillebrand.	A. Keith, B. U. S. G. S., 168, p. 52, 1900.	Diorite.	
Cr_2O_3 trace NiO 0.10	Q 0.3 or 1.1 ab 17.3 an 32.8	di 13.5 hy 24.8 mt 5.3 il 1.5	Sec. 13, T. 47 N., R. 46 W., Penokee-Gogebic Reg., Michigan.	T. M. Chatard.	C. R. Van Hise, M. U. S. G. S., XIX, p. 357, 1892.	Diabase.	
	Q 1.0 or 1.7 ab 24.6 an 25.3	di 15.7 hy 22.8 mt 5.6	Sturgeon Falls, Menominee Valley, Michigan.	R. B. Riggs.	G. H. Williams, B. U. S. G. S., 62, p. 76, 1890.	Gabbro.	Dried at 105°. Altered.
	or 3.9 ab 11.0 an 42.0	di 3.9 hy 29.9 ol 2.9 mt 1.9 il 1.8	Crystal Falls, Michigan.	G. Steiger.	J. M. Clements, J. G., VI, p. 382, 1898. Corrected.	Bronzite-norite.	Also in M. U. S. G.S., XXXVI, p. 245, 1899.
	or 4.4 ab 18.3 an 35.6	di 6.1 hy 10.0 ol 13.3 mt 5.6 il 2.6	Mansfield, Crystal Falls District, Michigan.	G. Steiger.	C. R. Van Hise, B. U. S. G. S., 168, p. 68, 1900.	Metadolerite.	Not fresh.
	or 2.2 ab 15.7 an 32.5	di 15.0 hy 21.1 ol 4.3 mt 5.8	Upper Quinnesec Falls, Menominee River, Wisconsin.	R. B. Riggs.	G. H. Williams, B. U. S. G. S., 62, p. 104, 1890.	Greenstone. (Diabase.)	Not fresh. Dried at 105°.
	Q 1.4 or 1.7 ab 10.5 an 39.5	di 21.1 hy 16.9 mt 6.2	Lower Quinnesec Falls, Menominee River, Wisconsin.	R. B. Riggs.	G. H. Williams, B. U. S. G. S., 62, p. 89, 1890.	Gabbro-diorite.	Dried at 105°.
	or 7.2 ab 21.0 an 29.7	di 12.8 hy 16.1 ol 5.3 mt 6.3	Frogrock Lake, Minnesota.	Dodge and Sidener.	M. E. Wadsworth, B. G. Nh. S. Minn., p. 126, 1887.	Porphyrite.	
	ab 25.2 an 33.6	di 12.2 hy 19.7 ol 3.6 mt 0.7	Bashitanaqueb Lake, Cook County, Minnesota.	A. D. Meeds.	N. H. Winchell, 21 A. R. G. Nh. S. Minn., p. 151, 1893.	Gabbro.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
26	49.56	17.81	2.76	9.48	5.93	9.70	2.87	none	0.50			0.48	0.57	0.06		99.82	2.967
A2. II	.826	.175	.017	.133	.148	.173	.047	—				.006	.004	.001			
27	45.66	16.44	0.66	13.90	11.57	7.23	2.13	0.41	0.83	0.07		0.92	0.05	trace		100.03	
A1. I	.761	.161	.004	.193	.289	.129	.034	.004				.011	—	—			
28	43.50	18.06	7.52	7.64	3.47	13.39	2.00	1.30	1.22			2.10				100.20	
A3. III	.725	.177	.047	.106	.087	.239	.032	.014				.026					
29	42.03	13.60	7.55	6.65	6.41	14.15	1.83	0.97	1.08			3.70	0.57			99.23	
A2. II	.701	.133	.048	.093	.160	.252	.030	.010				.046	.004				
30	45.71	10.80	4.43	9.35	13.75	10.48	1.58	0.85	0.97			1.83	0.11	0.17	trace	100.13	
A2. II	.762	.106	.028	.130	.344	.187	.025	.009				.023	.001	.002	—		
31	47.17	17.85	7.42	1.18	6.54	10.12	2.94	0.56	0.65			2.13	0.20	none		100.55	
A2. II	.786	.175	.046	.015	.166	.180	.047	.006				.027	.001	—			
32	47.54	16.73	6.69	6.67	6.38	8.74	2.81	1.10	0.36			2.76	0.51	0.19	0.03	100.51	
A2. II	.792	.164	.042	.093	.160	.156	.045	.012				.034	.004	.003	—		
33	51.32	15.28	0.47	8.59	7.25	11.58	2.92	0.22	0.95	0.06		1.23	0.25	0.16	none	100.28	
A2. II	.855	.150	.003	.120	.181	.207	.047	.002				.015	.002	.002	—		
34	50.89	16.76	3.86	4.69	8.49	11.72	2.61	0.32	0.41	—		0.79	0.09	0.13	trace	100.76	
A2. II	.848	.164	.024	.065	.212	.209	.042	.003				.010	.001	.002	—		
35	47.93	18.51	2.07	7.25	9.03	11.14	2.28	0.24	0.76		none	0.73	0.11	0.20		100.25	
A2. II	.799	.181	.013	.101	.226	.199	.037	.003			—	.009	.001	.003			
36	44.77	17.82	5.05	6.95	8.22	10.36	2.13	0.92	2.64			0.53	0.72	trace		100.11	
A2. II	.746	.175	.032	.097	.206	.185	.034	.010				.007	.005	—			
37	48.26	14.83	3.27	5.97	8.77	11.38	1.57	1.13	3.37	0.10	1.24	0.51	0.25	0.15	0.05	100.85	
A1. I	.804	.145	.020	.083	.219	.203	.026	.011				.006	.002	.002	—		
38	52.06	14.34	2.11	7.74	9.26	8.05	1.74	0.73	2.90	0.59		0.47	0.13	trace		100.12	
A. II	.868	.140	.013	.107	.232	.144	.028	.008				.006	.001	—			
39	49.36	16.35	2.93	8.55	7.06	10.08	2.67	0.82	0.65	0.22		0.98	0.30	0.19	0.04	100.25	
A1. I	.823	.160	.018	.119	.177	.180	.043	.009				.012	.002	.003	—		
40	52.18	15.44	4.26	5.10	8.89	8.57	2.11	0.55	2.16			trace	trace			99.26	2.848
B3. IV	.870	.151	.027	.071	.222	.153	.034	.006				—	—				
41	52.78	13.66	2.40	8.64	7.95	9.52	2.34	0.20	1.89	—	none	0.23	none	0.11		99.72	
A2. II	.880	.134	.015	.120	.199	.169	.037	.002				.003	—	.002			
42	52.16	14.72	4.11	7.18	9.44	8.44	1.49	0.32	1.06	—	none	0.42	0.06	0.48		100.17	
A2. II	.869	.144	.026	.100	.236	.150	.024	.003				.005	—	.007			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 3. PRESODIC. AUVERGNOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		ab 24.6 an 35.6	di 6.4 hy 26.1 mt 3.9 il 0.9 ap 1.7	Sec. 26, T. 64 N., R. 8 W., Minnesota.	W. H. Melville.	W. S. Bayley, J. G., III, p. 10, 1895.	Gabbro.	
Cr_2O_3 NiO	trace 0.16	or 2.2 ab 17.8 an 34.2	di 1.4 hy 10.1 ol 30.3 mt 0.9 il 2.6	Birch Lake, Minnesota.	H. N. Stokes.	W. S. Bayley, J. G., I, p. 712, 1893.	Olivine-gabbro.	
		or 7.8 ab 12.1 an 37.0 ne 2.6	di 24.1 ol 1.1 mt 10.9 il 4.0	Magnet Cove, Arkansas.	W. A. Noyes.	J. F. Williams, A. R. Ark. G. S., 1890, II, p. 295, 1891.	Amphibole-monchiquite.	
SO_3 NaCl FeS_2	0.08 0.03 0.56	or 5.6 ab 12.6 an 25.9 ne 1.7	di 31.8 ol 0.9 mt 11.1 il 7.0 ap 1.2	Fourche Mountain, Little Rock, Arkansas.	Noyes and Brackett.	J. F. Williams, A. R. Ark. G. S., 1890, II, p. 108, 1891.	Fourchite.	Sum low.
		or 5.0 ab 13.1 an 20.0	di 26.2 hy 6.3 ol 18.3 mt 6.5 il 3.5	Conical Peak, Crazy Mountains, Montana.	L. G. Eakins.	J. P. Iddings, B. U. S. G. S., 148, p. 146, 1897.	Hornblende-picrite.	Nearly in dofemane.
SO_3 Li_2O Fe	0.51 0.02 3.26	or 3.3 ab 24.6 an 33.9	di 10.4 hy 11.8 il 2.3 hm 7.4 tn 2.0 ir 3.3	Prospect Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, B. U. S. G. S. 148, p. 135, 1897.	Basalt.	Iron from mortar? Near No. 16, hessose.
		Q 1.3 or 6.7 ab 23.6 an 29.7	di 8.2 hy 14.3 mt 9.7 il 5.2 ap 1.2	Near Grant's Mountain, Taylor Region, New Mexico.	T. M. Chatard.	J. S. Diller, B. U. S. G. S., 148, p. 185, 1897.	Basalt.	
SrO Li_2O	trace trace	or 1.1 ab 24.6 an 28.1	di 23.9 hy 13.3 ol 4.9 mt 0.7 il 2.3	Hornitos, Mariposa County, California.	W. F. Hillebrand.	H. W. Turner, J. G., III, p. 403, 1895.	Diabase.	Also in 17 A. R. U. S. G. S., I, p. 694, 1896.
		Q 0.4 or 1.7 ab 22.0 an 33.1	di 20.0 hy 15.9 mt 5.6 il 1.5	Inskip Crater, Lassen Peak, California.	Hillebrand and Chatard.	J. S. Diller, B. U. S. G. S., 148, p. 200, 1897.	Basalt.	Dried at 110°.
		or 1.7 ab 19.4 an 39.2	di 13.2 hy 8.3 ol 13.2 mt 3.0 il 1.4	Paine's Creek, Lassen Peak, California.	T. M. Chatard.	J. S. Diller, B. U. S. G. S., 148, p. 200, 1897.	Basalt.	
		or 5.6 ab 17.8 an 36.4	di 8.8 hy 6.8 ol 12.7 mt 7.4 il 1.1 ap 1.6	Kosk Creek, Shasta County, California.	L. G. Eakins.	J. S. Diller, A. G., XIX, p. 255, 1897.	Hornblende-basalt.	
SrO Li_2O	trace trace	or 6.1 ab 13.6 an 30.0	di 21.2 hy 18.2 ol 0.7 mt 4.6 il 0.9	Brown's Valley, Yuba County, California.	W. F. Hillebrand.	W. Lindgren, B. U. S. G. S., 148, p. 228, 1897.	Diabase-porphyrite.	Not fresh.
		Q 5.0 or 4.4 ab 14.7 an 28.9	di 9.1 hy 30.5 mt 3.0 il 1.1	Mitchell Canyon, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 412, 1891.	Diabase.	
NiO SrO Li_2O	0.05 none none	or 5.0 ab 22.5 an 30.0	di 16.3 hy 12.1 ol 6.9 mt 4.2 il 1.8	Santa Maria Basin, Arizona.	W. F. Hillebrand.	J. P. Iddings, B. U. S. G. S., 148, p. 187, 1897.	Mica-basalt.	Not described.
		Q 6.0 or 3.3 ab 17.8 an 30.9	di 9.4 hy 23.5 mt 6.4	Cerro San Miguel, Puebla, Mexico.	A. Röhrig.	A. Hoppe, in Felix and Lenk, Btr. G. Mex., II, p. 213, 1899.	Hypersthene-basalt.	Sum low.
S	none	Q 4.7 or 1.1 ab 19.4 an 26.4	di 16.8 hy 25.7 mt 3.5	Urinambo, Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Dist., II, p. 11, 1898.	Epidiorite	Dried at 110°.
FeS_2	0.29	Q 8.0 or 1.7 ab 12.6 an 32.5	di 7.5 hy 28.2 mt 6.0 il 0.8	Upper Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Dist., II, p. 9, 1898.	Diorite	Dried at 110°.

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
43	49.46	16.77	1.98	6.57	9.33	11.17	1.55	0.04	2.02	——	0.27	0.79	none	trace		99.95	
A2. II	.824	.164	.013	.092	.233	.200	.025	——				.010	——	——			
44	47.28	13.24	4.44	10.50	5.94	11.04	2.62	0.31	2.00			1.48		0.40		99.25	
B2. III	.788	.130	.027	.146	.149	.197	.042	.003				.018		.006			
45	45.96	12.68	7.63	7.94	8.25	8.36	1.88	0.98	4.10		2.43			0.61		100.78	2.96
A3. III	.766	.124	.048	.110	.206	.149	.030	.010						.009			
46	47.29	16.93	1.58	2.67	21.01	8.56	1.17	0.39	0.29							99.89	
A3. III	.788	.166	.010	.038	.525	.152	.019	.004									
47	44.90	17.25	1.71	4.30	20.41	10.89	1.22	0.56	0.33							101.57	
C3. V	.747	.169	.011	.060	.510	.194	.019	.006									
48	42.68	18.36	5.27	7.02	12.89	10.05	1.69	0.51	1.25							99.80	
A3. III	.711	.180	.033	.097	.322	.179	.027	.005									
49	47.00	15.20	5.69	6.59	8.76	12.60	1.45	0.66	0.30			2.30	trace	0.26		100.81	
B2. III	.783	.149	.035	.092	.219	.225	.023	.007				.029	——	.004			
50	50.05	16.80	0.84	11.06	10.97	6.46	1.75	1.13	0.10					0.54		99.70	
A3. III	.834	.165	.005	.154	.274	.115	.028	.012						.008			
51	46.52	16.11	11.76	6.31	5.45	9.79	2.20	1.83								100.38	
A3. III	.775	.158	.067	.088	.136	.175	.035	.020									
52	47.72	18.49	0.68	4.54	12.88	11.59	2.81	0.41	1.30		none	0.22	0.04	trace		100.76	2.916
A2. II	.795	.181	.004	.063	.322	.207	.045	.004				.003	——	——			14°
53	47.57	17.52	0.80	8.22	10.77	9.53	1.69	1.10	2.66							99.86	2.88
A3. III	.793	.172	.005	.114	.269	.169	.027	.011									
54	49.31	16.93	4.02	5.90	9.36	9.57	2.41	0.47	2.35							100.32	
A3. III	.822	.166	.025	.082	.234	.171	.039	.005									
55	48.87	16.24	5.30	5.21	7.65	8.92	3.03	0.96	2.20			0.82	0.31			99.51	
A2. II	.815	.159	.033	.072	.191	.159	.048	.010				.010	.002				
56	48.90	18.08	2.52	3.20	11.43	14.10	1.53	0.25	0.88					trace		100.89	
B3. IV	.815	.177	.016	.044	.286	.251	.024	.003						——			
57	48.65	15.95	2.49	6.32	11.53	11.66	1.96	none	1.67							100.23	
A3. III	.811	.156	.015	.088	.288	.208	.032	——									
58	46.15	13.57	3.61	8.15	12.63	15.15	1.29	trace	n. d.							100.55	
A3. III	.769	.133	.022	.113	.316	.271	.021	——									
59	45.45	17.40	4.43	7.34	11.06	11.95	1.76	trace	0.36							99.75	
A3. III	.758	.170	.027	.102	.279	.213	.028	——									
60	43.75	18.02	7.50	5.31	10.68	12.40	1.46	0.51	1.21							100.84	
B3. IV	.729	.176	.047	.074	.267	.221	.023	.005									
61	46.16	13.86	5.26	1.81	11.60	15.74	1.05	0.30	3.40					trace		99.18	3.00
B3. IV	.769	.136	.033	.025	.290	.281	.017	003						——			15°

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 3. PRESODIC. AUVERGNOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
S NiO CoO	none trace trace	Q 2.0 ab 13.1 an 38.6	di 13.6 hy 26.0 mt 3.0 il 1.5	Barima District, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Dist., II, p. 6, 1898.	Diabase.	Dried at 110°. "Altered."
		or 1.7 ab 22.0 an 23.6	di 25.5 hy 12.6 ol 2.3 mt 6.3 il 2.8	Cape Flora, Franz Josef Land.	J. J. H. Teall.?	J. J. H. Teall, Q. J. G. S., LIV, p. 647, 1898.	Basalt.	Sum low.
		Q 1.5 or 5.6 ab 15.7 an 23.4	di 14.9 hy 21.5 mt 11.1	Binniaro Firth, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edinb., XXXIX, p. 887, 1900.	Camptonite.	Not fresh.
		or 2.2 ab 10.0 an 39.8	di 2.0 hy 15.1 ol 28.3 mt 2.3	Etang de Lherz, Pyrenees, France.	A. Pisani.	A. Lacroix, C. R. VIII, Cong. G. Int., p. 833, 1901.	Ariegite.	Near kedabekase.
		or 3.3 ab 3.1 an 40.0 ne 3.7	di 11.0 ol 37.4 mt 2.6	Tuc d'Ess, Pyrenees, France.	A. Pisani.	A. Lacroix, C. R. VIII, Cong. G. Int., p. 833, 1901.	Ariegite.	Sum high. Near kedabekase.
		or 2.8 ab 12.1 an 41.1 ne 1.1	di 6.9 ol 26.8 mt 7.7	Escourget, Pyrenees, France.	A. Pisani.	A. Lacroix, C. R. VIII, Cong. G. Int., p. 833, 1901.	Ariegite.	
		Q 0.7 or 3.9 ab 12.1 an 33.1	di 23.9 hy 14.2 mt 8.1 il 4.5	Sölvsberget, Gran, Norway.	G. Särnström.	W. C. Brögger, Q. J. G. S., L, p. 19, 1894.	Essexite.	Incomplete in Z. K., XVI, p. 27, 1890.
		or 6.7 ab 14.7 an 32.0 C 1.0	hy 33.7 ol 9.8 mt 1.2	Elestad, West Blekinge, Sweden.	H. Santesson.	J. C. Moberg, Afh. Sv. G., Und., No. 158, p. 27, 1896.	Diabase.	C of norm is TiO_2 and P_2O_5. "Apatite abundant."
		Q 0.6 or 11.1 ab 18.3 an 28.6	di 15.9 hy 8.9 mt 15.5	Kantua, Eura, Finland.	Not stated.	H. Gylling, Finl. G., Und., Bl. 12, p. 55, 1888.	Diabase.	
Cl SrO Li_2O	trace trace trace	or 2.2 ab 14.7 an 36.7 ne 4.8	di 16.7 ol 22.9 mt 0.9	Hohenberg, n. Buhne, Westphalia.	P. Jannasch.	F. Rinne, Sb. Berl. Ak., 1891, p. 980.	Olivine-gabbro.	Inclusion in basalt.
		or 6.1 ab 14.1 an 37.3	di 7.9 hy 12.1 ol 18.5 mt 1.2	Reiffenberg, Schorbach, Hesse.	H. Wolff.	H. Wolff, cf. N. J., 1891, II, p. 279.	Nephelite-basanite.	Alkalies?
		or 2.8 ab 20.4 an 33.9	di 11.0 hy 20.0 ol 4.3 mt 5.8	St. Sigismund, Tyrol.	Not stated.	H. v. Foullon, Jb. G. R-A. Wien, XXXVI, p. 771, 1886.	Porphyrite.	
		or 5.6 ab 25.2 an 28.1	di 12.9 hy 14.2 ol 2.0 mt 7.7 il 1.5	Fitz am Berg, Salzkammergut, Tyrol.	C. v. John.	C. v. John, Jb. G. R-A. Wien, XLIX, p. 254, 1899.	Diabase.	
S	trace	or 1.7 ab 12.6 an 41.7	di 22.1 hy 9.1 ol 9.0 mt 3.7	Mount Collon, Arolla, Switzerland.	A. Brunet.	A. Brun, cf. N. J. 1897, I, p. 475.	Gabbro.	
NiO	trace	ab 16.8 an 34.5	di 18.7 hy 13.7 ol 11.2 mt 3.5	Gaggio Montano, Bologna, Italy.	P. E. V. de Regny.	P. E. V. de Regny, cf. N. J., 1900, II, p. 397.	Gabbro.	
		ab 7.9 an 31.1 ne 1.7	di 36.3 ol 18.3 mt 5.1	Deneschkin Kamen, Ural Mountains, Russia.	Krekmeyerom and Kultacheff.	Loewinson-Lessing, G. Sk. Jushno-Saos., Dorpat, 1900, p. 166.	Hypersthene-gabbro.	
		ab 14.7 an 39.5	di 16.0 hy 4.3 ol 18.6 mt 6.3	Supreya, Ural Mountains, Russia.	Kultacheff.	Loewinson-Lessing, G. Sk. Jushno-Saos., Dorpat, 1900, p. 167.	Pyroxene-granulite (gabbro).	
		or 2.8 ab 10.5 an 41.1	di 16.6 hy 5.3 ol 11.7 mt 10.9	Between Solwa and Supreya, Ural Mountains, Russia.	Kultacheff.	Loewinson-Lessing, G. Sk. Jushno-Saos, Dorpat, 1900, p. 166.	Microdiorite.	
		or 1.7 ab 8.9 an 32.2	di 35.7 hy 4.9 ol 5.3 mt 7.1	Villia, n. Laurion, Greece.	R. Lepsius.	R. Lepsius, G. v. Attika, Berlin, 1893, p. 98.	Gabbro.	Sum low. Not fresh.

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
62	45.30	13.40	7.25	6.26	11.53	10.34	2.17	0.23	0.18			2.50	0.39	0.34		99.89	
A2. II	.755	.131	.045	.087	.288	.184	.037	.002				.031	.003	.005			
63	44.06	15.10	5.23	7.93	9.84	12.56	2.20	0.93	0.30			1.80	0.53	0.36		100.84	
A2. II	.734	.148	.032	.110	.245	.224	.035	.010				.023	.004	.005			
64	42.72	16.46	5.74	5.53	6.27	11.20	2.94	0.66	3.23			3.10	0.91	0.26		101.02 (99.02)	
C2. IV	.712	.161	.035	.076	.157	.200	.047	.007				.039	.006	.004			
65	42.08	16.04	5.93	8.75	6.95	12.63	1.88	0.93	2.76			2.26	0.34	0.32		100.90	
B2. III	.701	.157	.037	.122	.174	.226	.030	.010				.028	.002	.005			
66	51.75	14.67	6.27	4.73	5.19	11.94	2.70	0.58	1.86							99.69	
A3. III	.863	.144	.039	.065	.130	.213	.043	.006									
67	50.17	15.83	9.32	4.87	7.21	9.34	3.00	0.71	0.74							101.19	
B3. IV	.836	.155	.058	.068	.180	.167	.048	.008									
68	49.50	14.89	5.93	6.42	6.73	12.45	1.68	0.56	2.84							101.00	
B3. IV	.825	.146	.037	.089	.168	.222	.027	.006									
69	50.76	14.75	2.89	9.85	6.54	11.05	2.70	0.88	n. d.				0.26	0.41		100.09	
A3. III	.846	.145	.018	.138	.164	.197	.043	.009					.002	.006			
70	49.20	14.90	4.51	12.75	3.90	9.20	1.96	0.95	0.10			1.72	0.42	0.28		99.89	
A2. II	.820	.146	.028	.177	.098	.164	.032	.010				.022	.003	.004			
71	48.82	15.22	5.72	9.65	4.55	10.40	2.10	0.90	none			1.16	trace	0.67		99.19	3.01
B2. III	.814	.149	.035	.135	.114	.185	.034	.010				.014	—	.010			
RANG 5. PERCALCIC. KEDABEKASE.																	
1	48.02	20.01	1.13	7.29	10.05	11.42	0.51	0.05	0.57	0.10	0.25	0.23	trace	0.18	none	99.98	
A1. I	.800	.196	.007	.101	.251	.203	.008	.001				.003	—	.003	—		
2	46.85	20.02	2.30	4.60	10.16	13.84	1.32	trace	0.88			0.30	trace	trace		100.27	2.996
A3. III	.781	.196	.014	.064	.254	.247	.021	—				.004	—	—			
3	44.76	18.82	2.19	4.73	11.32	14.58	0.89	0.11	2.36	0.17		0.13	none	0.15		100.29	
A1. I	.746	.184	.014	.065	.283	.260	.014	.001				.002	—	.002			
4	47.49	15.81	1.07	4.50	10.39	15.53	1.16	trace	1.83	1.20			trace	0.41		99.45	
A3. III	.792	.155	.007	.062	.260	.277	.019	—					—	.006			
5	50.76	16.83	4.16	4.45	10.09	11.30	0.97	0.06	0.14	—	none	0.46	none	0.69		99.91	
A2. II	.846	.165	.026	.062	.252	.201	.016	.001				.006	—	.010			
6	47.09	16.99	1.62	3.60	19.92	9.20	0.50	0.25	0.83							100.00	
A3. III	.785	.167	.010	.050	.498	.164	.008	.003									
7	44.38	17.60	1.42	3.91	15.14	16.03	0.78	0.15	0.59							100.00	
A3. III	.740	.172	.009	.054	.379	.286	.013	.002									

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 3. PRESODIC. AUVERGNOSE—Continued.

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Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 1.1 di 18.1 ab 19.4 hy 12.8 an 25.6 ol 6.3 mt 10.4 il 4.8 ap 1.0	Punta Delgada, San Miguel, Azores.	C. v. John.	C. v. John, Jb. G. R-A. Wien, XLVI, p. 291, 1896.	Basalt.	
	or 5.6 di 21.7 ab 13.1 ol 15.6 an 28.6 mt 7.4 ne 2.8 il 3.5 ap 1.3	Punta Delgada, San Miguel, Azores.	C. v. John.	C. v. John, Jb. G. R-A. Wien, XLVI, p. 291, 1896.	Basalt.	
	or 3.9 di 15.7 ab 23.1 ol 6.1 an 29.7 mt 8.1 ne 0.9 il 6.0 ap 2.0	Mindello, San Vicente, Cape Verde Islands.	C. v. John.	C. v. John, Jb. G. R-A. Wien, XLVI, p. 286, 1896.	Limburgite.	Sum uncertain.
	or 5.6 di 24.6 ab 8.9 ol 9.5 an 32.5 mt 8.6 ne 3.7 il 4.3	Mindello, San Vicente, Cape Verde Islands.	C. v. John.	C. v. John, Jb. G. R-A. Wien, XLVI, p. 285, 1896.	Basalt.	
	Q 6.3 di 26.2 or 3.3 hy 4.0 ab 22.5 mt 9.0 an 26.4	North Kimberley, Griqualand West, South Africa.	Dodge.	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine-diabase.	
	Q 2.6 di 15.0 or 4.4 hy 12.2 ab 25.2 mt 13.5 an 27.5	Pfandstall, Colesberg, Cape Colony.	Wetzig.	E. Cohen, N. J. B. B., V, p. 245, 1887.	Diabase-porphyrite.	Sum high.
	Q 4.3 di 24.4 or 3.3 hy 12.0 ab 14.1 mt 8.6 an 31.4	Philipolis, Orange River Colony.	Liepmann.	E. Cohen, N. J. B. B., V, p. 244, 1887.	Diabase-porphyrite.	Sum high.
	or 5.0 di 24.0 ab 22.5 hy 12.3 an 25.9 ol 6.8 mt 4.2	Kilauea, Hawaii.	A. H. Phillips.	A. H. Phillips, A. J. S., XLVII, p. 473, 1894.	Basalt.	Pele's hair.
	Q 4.4 di 13.9 or 5.6 hy 19.8 ab 16.8 mt 6.5 an 28.9 il 3.4	Lava of May, 1883, Kilauea, Hawaii.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 135, 1888.	Basalt.	
	Q 3.6 di 18.6 or 5.6 hy 13.5 ab 17.8 mt 8.1 an 29.2 il 2.2	Kilauea, Hawaii.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 185, 1888.	Basalt.	Sum low.

SUBRANG. NOT NEEDED.

ZrO$_2$ none FeS$_2$ 0.11 Cr$_2$O$_3$ 0.03 V$_2$O$_3$ 0.02 NiO 0.01 SrO none	Q 0.7 di 3.7 or 0.5 hy 35.7 ab 4.2 mt 1.6 an 52.0	McKinsey's Mill, Cecil County, Maryland.	W. F. Hillebrand.	A. G. Leonard, B. U. S. G. S. 168, p. 45, 1900.	Norite.	Not described.
	ab 11.0 di 16.0 an 48.7 hy 9.3 ol 11.5 mt 3.2	Pikesville, Baltimore County, Maryland.	L. McCay.	G. H. Williams, B. U. S. G. S. 28, p. 37, 1886.	Gabbro-diorite.	
Cr$_2$O$_3$ 0.08 Li$_2$O trace	or 0.6 di 20.1 ab 7.3 hy 3.1 an 47.0 ol 16.0 mt 3.2	Wetheredville, Baltimore County, Maryland.	W. F. Hillebrand.	G. H. Williams, 15 A. R. U. S. G. S., p. 673, 1895.	Hypersthene-gabbro.	
NiO 0.06	ab 10.0 di 31.8 an 37.8 hy 7.8 ol 7.0 mt 1.6	Bagley Canyon, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 404, 1891.	Gabbro.	Near auvergnose.
S none CoO trace	Q 6.7 di 11.8 or 0.6 hy 23.8 ab 8.4 mt 6.0 an 41.1 il 0.9	Barima District, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N.W. District, II, p. 6, 1898.	Diabase.	Dried at 110°.
	or 1.7 di 1.8 ab 4.2 hy 25.8 an 43.4 ol 20.0 mt 2.3	Etang de Lherz, Pyrenees, France.	A. Pisani.	A. Lacroix, C. R. VIII. Cong. G. Int., p. 833, 1901.	Ariegite.	
	an 43.6 di 23.8 lc 0.8 ol 23.3 ne 3.7 am 1.9 mt 2.1	Etang de Lherz, Pyrenees, France.	A. Pisani.	A. Lacroix, C. R. VIII. Cong. G. Int., p. 832, 1901.	Ariegite.	

CLASS III. SALFEMANE—Continued.

RANG 4. PERCALCIC. KEDABEKASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
8	42.32	15.41	2.69	5.96	19.25	11.97	1.04	0.24	1.23							100.11	
A3. III	.705	.151	.017	.083	.481	.214	.016	.002									
9	38.95	19.80	3.01	4.54	16.42	12.05	0.89	0.37	3.36							99.39	
A3. III	.649	.195	.019	.063	.411	.215	.014	.004									
10	44.64	18.54	6.63	4.65	2.52	22.17	0.80	0.05	0.18					0.09		100.27	
A3. III	.744	.182	.041	.065	.063	.396	.013	.001									
11	44.11	19.38	5.17	5.44	2.90	21.98	0.50	0.13	0.26							99.87	
A3. III	.735	.190	.032	.075	.073	.393	.008	.001									

CLASS III. SALFEMANE.

RANG 1. PERALKALIC. WYOMINGASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	50.23	11.22	3.34	1.84	7.09	5.99	1.37	9.81	1.72	0.93		2.27	1.89	0.05	1.23	100.62 0.22	2.779
A1. I	.837	.110	.021	.026	.177	.107	.022	.104				.028	.013	.001	.008	100.40	13°

RANG 1. PERALKALIC. WYOMINGASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	48.90	7.85	11.46	13.32	0.38	1.95	7.40	3.23	1.80					1.11		99.39	
B2. III	.815	.077	.072	.185	.010	.035	.119	.034						.016			
2	50.00	9.87	3.46	5.01	11.92	8.31	2.41	5.02	1.16	0.17	0.31	0.73	0.81	trace	0.32	100.01	
A1. I	.833	.096	.022	.070	.298	.148	.039	.053				.009	.005	—	.002		

RANG 1. PERALKALIC. WYOMINGASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	50.70	13.72	6.07	7.64	0.04	0.86	12.32	1.91	4.84					1.42		100.56	
A2. II	.845	.134	.038	.106	.001	.015	.199	.020						.020			
2	40.03	10.88	12.24	5.12	4.13	11.74	3.67	3.33	2.22		1.15	5.46	0.76	trace		100.73	
A2. II	.667	.107	.077	.071	.103	.210	.059	.035				.068	.005	—			
3	48.39	11.64	4.09	3.57	12.55	7.64	4.14	3.24	2.56	0.28	none	0.73	0.45	trace	0.32	99.90	
A1. I	.807	.114	.025	.049	.314	.136	.067	.034				.009	.003	—	.002		
4	45.72	14.25	4.10	5.56	2.67	10.41	5.52	3.62	4.80			3.25	0.20			100.10	2.766
A2. II	.762	.140	.026	.077	.067	.186	.089	.038				.041	.001				

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG. NOT NEEDED—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 1.1 di 17.8 an 37.0 ol 33.6 ne 4.5 mt 3.9	Etang de Lherz, Pyrenees, France.	A. Pisani.	A. Lacroix, C. R. VIII. Cong. G. Int., p. 833, 1901.	Ariegite.	Near auvergnose.
	an 49.2 ol 33.2 lc 0.4 am 3.9 kp 0.9 mt 4.4 ne 4.0	Etang de Lherz, Pyrenees, France.	A. Pisani.	A. Lacroix, C. R. VIII. Cong. G. Int., p. 833, 1901.	Ariegite.	
	Q 0.5 di 19.5 or 0.6 wo 16.4 ab 6.8 mt 9.5 an 46.7	Kedabek, Elizabethpol, Russia.	A. Kupffer.	E. C. Federoff, Ann. Inst. Agr. Mosc., VII, 1901.	Kedabekite.	
	or 0.6 di 26.4 ab 2.1 wo 10.3 an 52.5 mt 7.4 ne 1.1	Kedabek, Elizabethpol, Russia.	A. Kupffer.	E. C. Federoff, Ann. Inst. Agr. Mosc., VII, 1901.	Kedabekite.	

ORDER 6. LENDOFELIC. PORTUGARE.

SUBRANG 1. PERPOTASSIC. WYOMINGOSE.

SO_3 0.74 Cl 0.03 F 0.50 Cr_2O_3 0.10 SrO 0.24 Ce_2O_3 0.03	or 44.5 ac 7.4 lc 10.5 di 13.9 ne 1.7 ol 7.9 il 4.1 hm 0.8 ap 4.5	Boar's Tusk, Leucite Hills, Wyoming.	W. F. Hillebrand.	W. Cross, A. J. S., IV, p. 130, 1897.	Wyomingite.	

SUBRANG 3. SODIPOTASSIC.

ZrO_2 1.96 Cl 0.03	or 18.9 ac 33.3 ab 7.9 ns 0.4 ne 8.0 di 8.5 Z 3.0 ol 17.8	Kangerdluarsuk, Greenland.	C. Detlefsen.	H. Rosenbusch, Elemente, p. 133, 1898.	Schlieren in lujavrite.	Sum low. Nearly in dofemane.
SO_3 0.02 Cl 0.08 F 0.16 Cr_2O_3 0.11 NiO 0.07 SrO 0.07	or 29.5 di 28.9 ab 8.9 ol 14.8 an 1.1 mt 5.1 ne 6.2 il 1.4 ap 1.7	Beaver Creek, Bearpaw Mountains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., I, p. 360, 1896.	Shonkinite.	

SUBRANG 4. DOSODIC.

ZrO_2 1.04	or 11.1 ac 17.6 ab 26.7 ns 5.7 ne 17.9 di 3.8 Z 1.5 ol 11.3	Kangerdluarsuk, Greenland.	C. Detlefsen.	H. Rosenbusch, Elemente, p. 215, 1898.	Arfvedsonite-analcite-tinguaite.	
	or 19.5 di 22.3 ab 4.2 wo 8.9 an 3.6 mt 0.9 ne 14.5 il 10.3 hm 11.7 ap 1.8	Oxford, New Jersey.	P. Jannasch.	H. Rosenbusch, Elemente, p. 235, 1898.	Camptonite.	Near monchiquose. Not fresh.
SO_3 0.08 Cl trace Cr_2O_3 0.07 NiO none SrO 0.15 Li_2O trace	or 18.9 di 24.4 ab 14.7 ol 15.2 an 3.6 mt 5.8 ne 11.1 il 1.4 ap 1.1	Bandbox Mountain, Little Belt Mts., Montana.	W. F. Hillebrand.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 545, 1900.	Analcite-basalt.	
	or 21.1 di 16.9 ab 10.5 wo 11.2 an 3.6 mt 6.0 ne 19.6 il 6.3	Fohberg, Kaiserstuhl, Baden.	K. Gruss.	K. Gruss, Mt. Bad. G. L-A. IV, p. 115, 1900.	Monchiquite.	Near malignose.

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. MONCHIQUASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	49.59	14.51	3.51	5.53	6.17	9.04	3.52	5.60	1.95			0.36	0.15	trace	0.49	100.78	
A1. I	.827	.142	.022	.076	.154	.160	.056	.060				.004	.001	—	.003		
2	47.98	13.34	4.09	4.24	7.01	9.32	3.51	5.00	2.10		1.24	0.58	1.03	trace	0.50	100.29	
A1. I	.800	.131	.026	.059	.175	.166	.056	.054				.007	.007	—	.003		
3	46.73	10.05	3.53	8.20	9.25	13.22	1.81	3.76	1.24			0.78	1.51	0.28		100.54	
A1. I	.779	.099	.022	.114	.231	.236	.030	.040				.010	.010	.004			
4	48.98	12.29	2.88	5.77	9.19	9.65	2.22	4.96	0.56	0.26		1.44	0.98	0.08	0.43	99.99	
A1. I	.816	.120	.018	.080	.230	.172	.036	.053				.018	.007	.001	.003		
5	49.09	16.00	7.14	4.30	5.02	8.27	4.49	4.79	0.77					0.23		100.10	
A3. III	.818	.157	.045	.060	.126	.148	.072	.051						.003			
6	45.19	10.49	8.60	5.04	5.97	12.94	2.04	4.09	3.31		0.77	1.01		0.50		100.15	
A2. II	.753	.104	.054	.070	.149	.231	.033	.043				.013		.007			
7	43.85	15.25	7.63	4.57	4.47	8.54	4.22	4.04	1.80	0.63	1.67	3.25	0.79	0.33		101.04	2.778
B2. III	.731	.150	.048	.063	.112	.153	.068	.043				.041	.005	.005			
8	49.65	14.39	4.21	3.48	6.27	10.12	3.21	5.46	2.37				0.79	0.25		100.19	
A3. III	.828	.141	.026	.049	.157	.180	.051	.059					.005	.004			

RANG 2. DOMALKALIC. MONCHIQUASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	48.35	13.27	4.38	3.23	8.36	9.94	3.35	3.01	2.89	0.90	0.30	0.52	0.40	0.19	0.54	100.01	
A1. I	.806	.130	.027	.044	.209	.177	.054	.032				.006	.003	.003	.004		
2	47.82	13.56	4.73	4.54	7.49	8.91	4.37	3.23	3.37			0.67	1.10	trace	0.50	100.20	
A1. I	.797	.133	.029	.062	.187	.159	.071	.034				.008	.008	—	.003		
3	44.66	12.12	5.81	3.20	8.77	8.14	4.47	2.75	4.33		2.19	1.02	2.02	0.21		99.69	
A2. II	.744	.119	.036	.044	.219	.145	.072	.029				.012	.014	.003			
4	45.59	12.98	4.97	4.70	8.36	11.09	4.53	1.04	3.40	0.51		1.32	0.91	0.14	0.13	99.87	
A1. I	.760	.127	.031	.065	.209	.198	.072	.011				.016	.006	.002	.001		
5	49.09	11.98	6.22	7.94	7.62	10.59	3.93	2.00	n. d.			0.58	0.50			100.45	2.33
A2. II	.818	.117	.039	.110	.191	.189	.063	.021				.007	.004				
6	46.48	16.16	6.17	6.09	4.02	7.35	5.85	3.08	4.27		0.45	0.99				100.91	2.723
A2. III	.775	.158	.039	.085	.101	.131	.094	.033				.012					
7	44.39	13.12	4.19	7.38	9.54	9.55	4.17	2.22	1.96		0.16	2.40	0.93			100.18	
A2. II	.740	.129	.026	.103	.238	.170	.068	.023				.030	.006				
8	43.84	12.82	8.99	5.11	2.39	18.57	3.52	2.90	3.12			3.55				99.81	2.859
, III	.731	.125	.056	.071	.060	.242	.056	.031				.044					

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBRANG 3. SODIPOTASSIC. SHONKINOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 Cl SrO	0.02 0.13 0.21	or 33.4 an 7.2 ne 15.9	di 30.0 ol 5.9 mt 5.1 il 0.6	Davis Creek, Highwood Mts., Montana.	E. B. Hurlbut.	L. V. Pirsson, B. U. S. G. S., 148, p. 153, 1897.	Leucite-syenite.	
SO_3 Cl SrO	trace 0.21 0.14	or 30.0 ab 4.7 an 5.8 ne 13.3	di 27.8 ol 5.4 mt 6.0 il 1.1 ap 2.2	Near Highwood Peak, Highwood Mts., Montana.	H. W. Foote.	L. V. Pirsson, B. U. S. G. S., 148, p. 153, 1897.	Leucite-basalt.	
Cl	0.18	or 22.2 an 8.2 ne 8.5	di 40.1 ol 10.3 mt 5.1 il 1.5 ap 3.2	Square Butte, Highwood Mts., Montana.	L. V. Pirsson.	Weed and Pirsson, B. G. S. A., VI, p. 414, 1895.	Shonkinite.	MgO corrected, L. V. P., priv. contrib. 9.68 in original.
F Cr_2O_3 SrO Li_2O	0.22 trace 0.08 trace	or 29.5 ab 5.3 an 8.6 ne 6.8	di 26.5 ol 11.7 mt 4.2 il 2.6 ap 2.2	Yogo Peak, Little Belt Mts., Montana.	W. F. Hillebrand.	Weed and Pirsson, A. J. S., L., p. 474, 1895.	Shonkinite.	Also in 20 A. R. U.S.G.S., III, p. 484, 1900.
SO_3	trace	or 28.4 ab 7.9 an 9.5 ne 16.2	di 25.0 ol 2.1 mt 10.4	Laacher See, Rh. Prussia.	W. Bruhns.	W. Bruhns, cf. N. J. 1892, II, p. 418.	Trachyte.	
MoS_2	0.20	or 23.9 an 7.8 ne 9.4	di 33.3 wo 5.8 mt 12.5 il 2.0	Rosengärtchen, Heubach, Hesse.	K. Tichauer.	R. Wedel, Jb. Pr. G. L-A., XI, p. 33,* 1892.	Nephelite-basalt.	
		or 23.9 ab 7.9 an 10.8 ne 15.1	di 20.7 ol 1.5 mt 5.1 il 6.9 hm 4.2 ap 1.9	Ziegenberg, Nestersitz, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIV, p. 101, 1894.	Camptonitic monchiquite.	Sum high. Not fresh.
		or 32.8 ab 3.1 an 8.6 ne 12.8	di 28.9 ol 3.6 mt 6.0 ap 1.8	Near Khoi, Persia.	J. Steinecke.	J. Steinecke, Z. Nw. Halle, VI, p. 12, 1887.	Leucitophyre.	P_2O_5 given as 1.08 H_3PO_4.

SUBRANG 4. DOSODIC. MONCHIQUOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
F Cr_2O_3 NiO SrO Li_2O	0.25 trace 0.04 0.09 trace	or 17.8 ab 14.7 an 12.2 ne 7.4	di 27.2 ol 6.7 mt 7.2 il 0.9 ap 1.0	Big Baldy Mountain, Little Belt Mts., Montana.	W. F. Hillebrand.	L. V. Pirsson, 20 A. R. U. S. G. S., III, p. 548, 1900.	Analcite-basalt.	Near shonkinose.
SO_3 Cl SrO	trace 0.04 0.14	or 18.9 ab 17.8 an 7.8 ne 10.5	di 23.9 ol 7.4 mt 8.0 il 1.2 ap 2.5	Highwood Gap, Highwood Mts., Montana.	H. W. Foote.	L. V. Pirsson, B. U. S. G. S., 148, p. 153, 1897.	Monchiquite.	
		or 16.1 ab 19.9 an 5.0 ne 9.7	di 18.4 ol 9.4 mt 8.4 il 1.8 ap 4.5	Musselshell River, Crazy Mountains, Montana.	L. G. Eakins.	W. H. Weed, B. U. S. G. S., 148, p. 144, 1897.	Monchiquite?	Not described.
ZrO_2 Cl SrO Li_2O	0.03 0.05 0.12 trace	or 6.1 ab 18.9 an 12.2 ne 10.2	di 30.0 ol 6.5 mt 7.2 il 2.5 ap 1.9	"The Basin," Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, J. G., V., p. 689, 1897.	Analcite-basalt.	Not fresh
		or 11.7 ab 9.2 an 21.0 ne 6.5	di 32.1 ol 8.7 mt 9.0 il 1.1 ap 1.2	Santa Maria, Puebla, Mexico.	A. Hoppe.	A. Hoppe, in Felix and Lenk, Btr. G. Mex., II, p. 220, 1899.	Basalt.	Dried before analysis?
		or 18.3 ab 14.1 an 8.6 ne 19.0	di 22.3 ol 2.9 mt 9.0 il 1.8	Santa Cruz R. R., Cabo Frio, Brazil.	M. Hunter.	Hunter and Rosenbusch, T. M. P. M., XI, p. 454, 1890.	Monchiquite.	Border of essexose.
SO_3	0.17	or 12.8 ab 10.5 an 10.6 ne 13.6	di 24.8 ol 13.1 mt 6.0 il 4.6 ap 2.0	Freidrichstollen, Allendorf, Rh. Prussia.	Not stated.	F. Beyschlag, Erl. G. Kt. Preus. Bl. Allendorf, p. 47, 1886.	Basalt.	
		or 17.2 ab 12.1 an 10.6 ne 9.4	di 13.0 wo 16.7 mt 6.3 il 6.8 hm 4.8	Blankenhornberg, Kaiserstuhl, Baden.	K. Gruss.	K. Gruss, Mt. Bad. G. L-A., IV, p. 126, 1900.	Leucite-basanite.	

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. MONCHIQUASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
9	47.83	16.09	4.32	3.62	5.53	10.68	4.46	4.05	0.24	0.05		2.27	1.33	trace		100.47	2.858
A2. II	.797	.158	.027	.050	.138	.191	.072	.043				.028	.009	——			
10	45.56	14.43	7.71	6.07	0.87	9.23	5.57	2.45	2.79	0.49	0.25	1.73	1.02	1.47		99.64	2.759
A2. II	.759	.141	.048	.084	.022	.165	.090	.026				.022	.007	.021			
11	43.35	11.46	11.98	2.26	11.69	7.76	3.88	0.99	2.41	0.59		2.43	1.54			100.34	2.974
A2. II	.723	.112	.075	.031	.292	.138	.063	.011				.030	.011				
12	44.64	12.74	4.21	11.17	5.82	10.12	4.31	1.41	0.51			5.86		0.20		100.99	
B2. III.	.744	.125	.026	.156	.146	.180	.069	.015				.073		.003			
13	44.63	13.77	7.30	5.60	4.47	7.96	4.20	2.65	4.04		1.34	4.25	0.09	0.08		100.43	
A.2 II	.744	.135	.045	.078	.112	.142	.068	.029				.053	.001	.001			
14	45.61	15.70	6.17	7.29	4.84	6.34	5.06	2.67	2.34			3.48		trace		99.50	2.87
A3. III	.760	.154	.039	.101	.121	.112	.081	.029				.044		——			

RANG 3. ALKALICALCIC. LIMBURGASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	42.46	12.04	2.19	5.34	12.40	12.14	1.21	2.68	4.03		0.55	2.47	0.84	0.16		99.51	2.94
A2. II	.708	.118	.014	.074	.310	.217	.020	.029				.031	.006	.002			
2	43.74	14.82	2.40	7.52	6.98	10.81	3.08	2.90	2.94		1.50	2.80	0.64			100.23	2.914
A2. II G	.729	.145	.015	.104	.175	.193	.050	.031				.035	.004				

RANG 3. ALKALICALCIC. LIMBURGASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	45.11	12.44	2.67	9.36	11.56	10.61	3.05	1.01	0.78	0.16		2.34	0.51	0.22	trace	100.02	3.118
A1. I	.752	.122	.017	.130	.289	.189	.049	.011				.029	.003	.003	——		20°
2	42.35	12.29	3.89	7.05	13.09	12.49	2.74	1.04	1.50	0.32		1.82	0.99	0.21	0.10	100.19	3.122
A1. I	.706	.120	.024	.098	.327	.223	.043	.011				.023	.007	.003	.001		22°
3	43.66	17.35	7.88	5.40	4.27	9.39	5.12	2.07	1.99			1.21	1.32			99.66	
A2. II	.728	.170	.049	.075	.107	.167	.083	.022				.015	.009				
4	44.82	13.68	2.76	7.57	10.11	12.76	2.83	0.89	2.81			1.35	0.15			99.73	3.016
A2. II	.747	.134	.017	.106	.253	.227	.045	.009				.017	.001				
5	42.13	16.31	6.43	7.93	7.37	9.62	2.27	2.48	3.16		2.12			0.50		100.32	2.98
A3. III	.702	.160	.049	.110	.186	.171	.037	.026						.007			
6	39.13	11.38	7.33	8.13	8.64	11.77	2.47	1.93	2.87		2.41	4.02		0.42		100.50	3.07
A2. II	.652	.111	.045	.112	.216	.210	.040	.020				.050		.006			
7	43.65	11.48	6.32	8.00	7.92	14.00	2.28	1.51	1.00		trace	4.00	trace			100.16	
A2. II	.728	.114	.039	.111	.198	.250	.037	.016				.050	——				

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBRANG 4. DOSODIC. MONCHIQUOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SrO Li_2O	none none	or 23.9 ab 6.8 an 14.7 ne 16.8	di 23.9 ol 1.9 mt 6.3 il 4.3 ap 2.8	Falkenberg, Tetschen, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XIV, p. 105, 1894.	Leucite-tephrite.	
SO_3	trace	or 14.5 ab 30.4 an 7.0 ne 9.1	di 8.5 wo 9.5 mt 11.1 il 3.4 ap 2.2	Schichenberg, Tetschen, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIV, p. 104, 1894.	Nephelite-tephrite.	MnO high?
		or 6.1 ab 27.2 an 10.6 ne 3.1	di 14.5 ol 15.8 mt 0.2 il 4.6 hm 11.8 ap 3.4	Hutberg, Tetschen, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XIV, p. 110, 1894.	Augitite.	
		or 8.3 ab 16.2 an 11.4 ne 10.8	di 31.4 ol 5.3 mt 6.0 il 11.2	Island of 1891, n. Pantelleria, Mediterranean.	H. Foerstner.	H. Foerstner, T. M. P. M., XII, p. 512, 1891.	Basalt.	Sum high.
CuO	0.05	or 16.1 ab 19.4 an 10.6 ne 8.8	di 22.6 ol 0.5 mt 6.0 il 8.2 hm 3.0	Banatette River, Kupang Bay, Timor Island.	O. Pufahl.	A. Wichmann, Samml. G. Mus. Leiden, II, p. 87, 1887.	Foyaite.	
SnO_2	trace	or 16.1 ab 21.5 an 12.2 ne 11.4	di 15.0 ol 5.4 mt 9.0 il 6.6	Franklin Island, Antarctic.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 80, 1899.	Basalt.	Near essexose.

SUBRANG 3. SODIPOTASSIC. OUROSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Li_2O	trace	or 12.2 an 19.2 lc 3.1 ne 5.7	di 29.8 ol 14.5 mt 3.2 il 4.8 ap 1.9	Willow Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 115, 1896.	Monchiquite.	
Cl S	trace 0.10	or 17.2 ab 3.1 an 17.8 ne 12.5	di 26.8 ol 8.7 mt 3.5 il 5.4 ap 1.3	Rio do Ouro, Serra de Tingua, Brazil.	P. Jannasch.	Hunter and Rosenbusch, T. M. P. M., XI, p. 464, 1890.	Monchiquite.	Not fresh?

SUBRANG 4. DOSODIC. LIMBURGOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl S V_2O_3 NiO SrO Li_2O	0.11 0.01 0.04 0.04 trace trace	or 6.1 ab 13.1 an 17.2 ne 6.8	di 26.4 ol 19.8 mt 3.9 il 4.3 ap 1.1	Pinto Mountain, Uvalde County, Texas.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 61, 1900.	Basalt.	
ZrO_2 SO_3 S Cr_2O_3 V_2O_3 NiO SrO	none 0.05 trace 0.10 0.04 0.03 0.09	or 6.1 ab 3.7 an 18.3 ne 10.2	di 30.2 ol 17.9 mt 5.6 il 3.5 ap 2.2	Ciruella, Colfax County, New Mexico.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 171, 1900.	Nephelite-basanite.	
		or 12.2 ab 16.8 an 18.1 ne 14.5	di 16.6 ol 3.0 mt 11.4 il 2.3 ap 2.8	Island of Cabo Frio, Rio Janeiro, Brazil.	M. Dittrich.	H. Rosenbusch, Elemente, p. 172, 1898.	Essexite.	Near monchiquose.
		or 5.0 ab 7.3 an 23.4 ne 8.8	di 31.8 ol 14.2 mt 8.9 il 2.6	Las Amolanas, Atacama, Chile.	M. Dittrich.	F. v. Wolff, Z. D. G. G., LI, p. 506, 1899.	Limburgite.	
		or 13.5 ab 5.2 an 27.0 ne 7.7	di 16.8 ol 14.4 mt 9.3	Wart of Skaill, Sandwick, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edinb., XXXIX, p. 887, 1900.	Camptonite.	Not fresh.
		or 9.5 an 14.2 lc 1.3 ne 11.4	di 34.7 ol 5.5 mt 10.4 il 7.7	Hoxa, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edinb., XXXIX, p. 887, 1900.	Camptonite.	Not fresh.
		or 8.9 ab 5.8 an 17.0 ne 7.4	di 41.6 ol 2.3 mt 9.0 il 7.7	Brandberget, Gran, Norway.	L. Schmelck.	W. C. Brögger, Q. J. G. S., L, p. 19, 1894.	Olivine-gabbro-diabase.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. LIMBURGASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
8	40.60	12.55	5.47	9.52	8.96	10.80	2.54	1.19	2.28		2.68	4.20				100.79	
B2. III	.677	.123	.034	.123	.224	.193	.041	.013				.053					
9	37.90	13.17	8.83	8.37	9.50	10.75	2.35	2.12	1.40			5.30	trace			99.69	
A2. II	.632	.129	.055	.116	.238	.192	.039	.022				.066	—				
10	43.50	14.74	6.53	5.32	3.19	14.93	3.49	2.11	3.69			2.55	0.61			100.66	2.932
A2. II	.725	.144	.041	.074	.080	.266	.056	.022				.032	.004				
11	43.18	13.43	5.06	6.41	11.79	10.39	3.05	1.41	2.36		0.43	2.16	0.38			101.08	3.021
B2. III	.720	.132	.032	.089	.295	.185	.050	.015				.027	.003				
12	41.80	12.43	6.29	4.84	13.62	10.88	3.40	1.71	2.17		0.65	2.15	trace			101.01	3.011
B2. III	.697	.121	.039	.067	.341	.194	.055	.018				.027	—				
13	43.10	11.71	4.43	8.28	13.20	10.84	2.78	1.27	1.71			1.88	0.49			99.78	3.088
A2. II	.718	.114	.027	.115	.330	.193	.045	.014				.023	.004				
14	44.81	15.35	3.37	6.69	12.77	9.83	3.03	1.69	2.13				0.48			100.31	2.98
A3. III	.747	.150	.021	.093	.319	.175	.048	.018					.003				
15	42.32	12.11	4.97	6.13	15.21	9.78	2.66	1.92	2.17		0.62	2.17	0.26	0.14		101.56	3.069
C2. IV	.706	.119	.031	.085	.380	.175	.043	.020				.027	.002	.002			19°
16	42.02	13.86	5.81	5.84	10.39	11.43	3.61	0.86	2.41		0.56	1.88	0.11	0.31		101.28	3.028
C2. IV	.700	.136	.036	.081	.260	.203	.058	.009				.023	.001	.004			19°
17	44.78	12.76	5.42	8.34	10.17	10.23	3.56	1.81	1.42		0.93	0.25	0.92			100.59	2.952
A2. II	.746	.125	.034	.116	.254	.182	.057	.020				.003	.006				
18	43.63	14.14	7.72	4.96	9.73	11.83	2.84	1.45	3.22			trace	0.94			100.46	2.934
A3. III	.727	.138	.049	.069	.243	.210	.045	.016				—	.006				
19	41.58	16.96	8.06	4.61	10.76	11.12	4.23	1.23	1.74			trace	0.41			100.70	3.00
A3. III	.693	.166	.050	.064	.269	.198	.068	.013				—	.003				
20	42.75	17.24	8.10	5.88	6.17	11.14	4.21	2.48	1.06			2.13	trace			101.16	3.008
B2. III	.713	.169	.051	.082	.154	.199	.068	.026				.027	—				

RANG 4. DOCALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	41.99	17.58	6.17	8.33	8.03	8.53	2.12	2.81	2.99		1.80			0.29		100.64	3.01
A3. III	.700	.172	.039	.115	.201	.151	.034	.030						.004			

ORDER 6. LENDOFELIC. PORTUGARE—Continued

SUBRANG 4. DOSODIC. LIMBURGOSE—Continued.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		or 7.2 ab 6.8 an 19.2 ne 8.0	di 27.6 ol 11.1 mt 7.9 il 8.2	Maena, Gran, Norway.	V. Schmelck.	W. C. Brögger, Q. J. G. S., L, p. 26, 1894.	Camptonite.	Not fresh.
		or 7.2 an 18.9 lc 3.9 ne 11.1	di 26.9 ol 8.0 mt 11.6 il 10.2 hm 0.8	Brandberget, Gran, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 93, 1899.	Hornblendite.	
		or 12.2 ab 11.0 an 18.3 ne 9.9	di 17.3 wo 12.4 mt 9.5 il 5.1 ap 1.4	Limberg, Kaiserstuhl, Baden.	K. Gruss.	K. Gruss, Mt. Bad. G. L-A., IV, p. 134, 1900.	Augitite.	
X Cl	0.80 0.23	or 8.3 ab 7.3 an 18.6 ne 10.2	di 26.1 ol 15.0 mt 7.4 il 4.2	Ulmenstein, Rhöngebirge.	E. Möller.	E. Möller, N. J., 1888, I, p. 112.	Limburgite.	Sum high.
X SO_3 Cl	0.94 0.13 trace	or 10.0 an 13.3 ne 15.6	di 31.6 ol 13.8 mt 9.0 il 4.2	Pietzelstein, Rhöngebirge.	E. Möller.	E. Möller, N. J., 1888, I, p. 116.	Nephelite-basalt.	Sum high.
SO_3	0.09	or 7.8 ab 6.3 an 15.3 ne 9.4	di 27.7 ol 20.4 mt 6.3 il 3.5 ap 1.2	Ilmenberg, Rhöngebirge.	Klüss.	H. Proescholdt, Jb. Pr. G. L-A., XIV, p.12, 1894.	Basalt.	
Cl	0.16	or 10.0 ab 7.9 an 23.4 ne 9.4	di 17.8 ol 23.6 mt 4.9 ap 1.1	Steller's Kuppe, Hesse.	H. Wolff.	K. Oebbeke, Jb. Pr. G. L-A., IX, p. 402, 1889.	Nephelite-basanite.	
X SO_3 Cl	0.94 trace 0.16	or 11.1 ab 0.5 an 15.6 ne 11.9	di 26.0 ol 21.1 mt 7.2 il 4.2	Schaumburg, n. Cassel, Hesse-Nassau.	O. Fromm.	O. Fromm, Z. D. G. G., XLIII, p 68, 1891.	Limburgite.	Sum high.
X Cl	1.99 0.20	or 5.0 ab 6.8 an 19.2 ne 12.8	di 29.7 ol 10.3 mt 8.4 il 3.5	Hunrodsberg, n. Cassel, Hesse-Nassau.	O. Fromm.	O. Fromm, Z. D. G. G., XLIII, p. 75, 1891.	Nephelite-basalt.	Sum high.
SO_3	trace	or 11.1 ab 10.0 an 18.3 ne 10.8	di 25.6 ol 17.3 mt 7.9 ap 2.0	Hünenberg, Bl. Melsungen, Prussia.	G. F. Steffen.	F. Beyschlag, Erl. G. Kt. Preus. Bl. Melsungen, p. 20, 1891.	Basalt.	
		or 8.9 ab 11.0 an 21.4 ne 6.8	di 25.4 ol 10.5 mt 11.4 ap 1.9	Bachelsdorf, Tetschen, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XV, p. 247, 1896.	Basalt.	
		or 7.2 ab 1.6 an 23.6 ne 18.5	di 22.7 ol 12.9 mt 11.6 ap 1.0	Bachelsdorf, Tetschen, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XV, p. 247, 1896.	Basalt.	Near etindose.
		or 14.5 ab 0.5 an 20.9 ne 19.0	di 27.1 ol 2.5 mt 11.8 il 4.2	Scharfenstein, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XVII, p. 48, 1897.	Basalt.	Sum high.

SUBRANG 2. SODIPOTASSIC.

		or 16.7 ab 4.2 an 30.0 ne 7.4	di 9.7 ol 18.4 mt 9.0	Rennibuster, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edinb., XXXIX, p. 887, 1900.	Camptonite.	Properly in limburgose, if TiO_2 were determined. Cf. Nos. 5 and 6.

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	38.58	20.42	7.60	5.91	12.93	9.43	2.29	1.39	1.25							99.80	
A3. III	.643	.200	.048	.082	.323	.168	.037	.015									
2	41.18	17.94	9.81	1.16	11.18	12.38	3.15	0.93	2.03			0.50				100.26	3.064
A3. III	.686	.176	.061	.017	.280	.221	.051	.010				.006					
3	41.13	18.18	4.71	7.64	10.59	13.20	2.00	1.59	1.74							100.78	
A3. III	.686	.178	.029	.106	.265	.235	.032	.017									
4	42.71	16.03	9.31	1.83	10.44	14.70	2.71	0.24	2.78							100.75	
A3. III	.712	.157	.058	.025	.261	.262	.043	.003									
5	39.84	19.71	7.73	8.89	7.33	13.52	1.59	0.53	0.86			0.08	trace	trace		100.08	3.182
A2. II	.664	.193	.049	.124	.183	.241	.026	.006				.001	—	—			15°
6	38.62	13.90	5.97	8.65	11.21	15.54	2.01	0.57	1.46			1.86	0.60	0.30		100.69	
A2. II	.644	.136	.037	.121	.280	.277	.032	.007				.023	.004	.004			

CLASS III. SALFEMANE.

RANG 1. PERALKALIC. MALIGNASE.

1	47.85	13.24	2.74	2.65	5.68	14.36	3.72	5.25	2.74				2.42			100.65	2.879
A3. III	.798	.130	.017	.037	.142	.256	.060	.056					.017				

RANG 1.′ PERALKALIC. MALIGNASE.

1	51.88	14.13	6.45	0.94	3.44	10.81	6.72	4.57	0.18			0.33	0.96			100.41	2.88
A2. II	.865	.139	.040	.013	.086	.193	.108	.049				.004	.007				
2	51.38	15.88	1.48	4.37	4.43	8.62	7.57	4.20	0.42			0.12	0.98			99.45	
A2. II	.856	.156	.009	.061	.111	.154	.122	.045				.002	.007				
3	44.65	13.87	6.06	2.94	5.15	9.57	5.67	4.49	2.10	0.96	0.11	0.95	1.50	0.17	0.76	99.92	
A1. I	.744	.136	.038	.041	.129	.171	.091	.048				.012	.011	.002	.005		
4	42.02	12.05	7.93	5.06	2.18	17.01	4.95	3.15	0.67			2.36	1.66	0.96		100.54 .34	
A2. II	.700	.118	.050	.071	.055	.304	.080	.034				.029	.012	.014		100.20	

RANG 2. DOMALKALIC. KAMERUNASE.

1	46.04	12.23	3.86	4.60	10.38	8.97	2.42	5.77	2.87			0.64	1.14	trace	0.48	99.76	
A1. I	.767	.120	.024	.064	.260	.160	.039	.062				.008	.008	—	.003		

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBRANG 3. PRESODIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 1.1 di 4.3 an 41.1 ol 24.7 lc 5.7 mt 11.1 ne 10.5	Lherz, Pyrenees, France.	A. Pisani.	A. Lacroix, C. R. VIII. Cong. G. Int., p. 833, 1901.	Ariegite.	
	or . 4.5 di 22.9 an 32.0 ol 12.2 lc 0.9 mt 2.6 il 0.9 ne 14.5 hm 8.0	Kreuzberg, Rhöngebirge.	E. v. Seyfried.	E. v. Seyfried, cf. N. J., 1898, II, p. 65.	Basanite.	Iron oxides?
	an 35.9 di 16.7 lc 7.4 ol 19.2 ne 9.1 am 3.2 mt 6.7	Eckmannshain, Vogelsberg, Hesse.	H. Sommerlad.	H. Sommerlad, N. J., 1884, II, p. 223.	Leucite-basalt.	
	or 1.7 di 32.6 ab 3.7 ol 7.7 an 30.9 mt 5.8 ne 10.2 hm 5.3	Burberg, n. Carlsbad, Bohemia.	J. M. Clements.	J. M. Clements, Jb. G. R-A. Wien, XL., p. 345, 1890.	Basalt.	Iron oxides?
	or 3.3 di 18.3 ab 0.5 ol 13.9 an 44.8 mt 11.4 ne 7.1	Pavone, n. Ivrea, Piedmont.	M. Dittrich.	F. R. van Horn, T. M. P. M., XVII, p. 414, 1898.	Hornblende-gabbro.	
	an 27.0 di 17.9 lc 3.1 ol 19.7 ne 9.1 am 8.8 mt 8.6 il 3.5 ap 1.2	Dakar Peak, Cape Verde Islands.	C. v. John.	C. v. John, Jb. G. R-A. Wien, XLVI, p. 288, 1896.	Limburgite.	

ORDER 7. LENFELIC. KAMERUNARE.

SUBRANG 3. SODIPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 23.4 di 35.6 an 3.9 wo 3.3 lc 6.1 mt 4.0 ne 17.0 ap 5.3	Poohbah Lake, Rainy River district, Ontario.	F. L. Ransome.	A. C. Lawson, B. Dep. G. Un. Cal., I, p. 350, 1896.	Nephelite-pyroxene-malignite.	

SUBRANG 4. DOSODIC. MALIGNOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 27.2 ac 8.3 ab 7.9 di 18.5 ne 21.3 wo 10.0 mt 2.1 il 0.6 hm 2.0 ap 2.2	Poohbah Lake, Rainy River district, Ontario.	W. C. Blasdale.	A. C. Lawson, B. Dep. G. Un. Cal., I, p. 356, 1896.	Garnet-pyroxene-malignite.	
	or 25.0 ac 4.2 ab 2.6 di 36.8 ne 27.3 ol 0.7 ap 2.2	Poohbah Lake, Rainy River district, Ontario.	J. W. Sharwood.	A. C. Lawson, B. Dep. G. Un. Cal., I, p. 359, 1896.	Amphibole-malignite.	Sum low.
SO_3 0.61 Cl trace SrO 0.37 Li_2O trace	or 26.7 di 27.9 ab 2.6 wo 0.2 an 1.1 mt 6.6 ne 18.5 il 1.8 no 5.0 hm 1.4 ap 3.5	Gordon's Butte, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 150, p. 201, 1898.	Theralite.	
S 0.54	or 18.9 di 11.9 ab 1.6 wo 23.8 an 1.1 mt 9.7 ne 21.9 il 4.5 hm 1.3 ap 4.0	As, Alnö, Sweden.	N. Sahlbom.	N. Sahlbom, N. J., 1897, II, p. 99.	Ijolite-porphyry.	

SUBRANG 3. SODIPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 trace Cl 0.11 SrO 0.25	or 22.2 di 26.3 an 5.3 ol 12.3 lc 9.6 mt 5.6 ne 11.1 il 1.2 ap 2.6	Arrow Peak, Highwood Mountains, Montana.	H. W. Foote.	L. V. Pirsson, B. U. S. G. S., 148, p. 153, 1897.	Leucite-basalt?	

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. KAMERUNASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	44.31	17.20	4.64	3.73	6.57	10.40	4.45	3.64	3.30	0.77				0.10		99.11	
B3. IV	.739	.169	.029	.051	.164	.185	.072	.038						.001			
2	41.80	14.56	6.09	6.41	4.66	14.87	4.25	1.94	1.18		0.40	4.14	0.52			100.82	
B2. III	.697	.143	.038	.089	.117	.265	.069	.021				.052	.004				
3	47.10	16.42	4.63	7.04	5.00	7.64	6.36	3.47	0.40			1.75	0.48	0.36		100.65	
A2. II	.785	.161	.029	.098	.125	.136	.103	.037				.022	.003	.005			
4	45.77	16.66	3.72	6.21	7.03	9.01	6.23	2.28	1.87		trace	1.70	0.29	trace		100.27	
A2. II	.763	.158	.023	.086	.176	.161	.105	.024			—	.021	.002	—			
5	42.77	14.16	5.05	6.26	2.69	14.34	4.67	2.51	3.60			3.05	0.30			99.40	2.904
A3. III	.713	.139	.032	.087	.067	.255	.075	.027				.038	.002				
6	39.88	15.37	8.67	2.91	7.16	13.83	4.73	2.01	2.17			1.04	2.29	trace		100.06	2.918
A2. II	.665	.150	.054	.040	.179	.246	.076	.022				.013	.016	—			
7	48.87	12.11	3.17	10.21	3.52	15.18	5.11	1.81	0.58			0.72		trace		101.28	3.10
B2. III	.815	.119	.020	.142	.088	.271	.082	.019				.009		—			
8	46.53	14.31	3.61	8.15	6.56	12.13	4.95	1.58	0.20			2.99		0.22		101.23	2.96
B2. III	.776	.140	.023	.113	.164	.217	.080	.018				.036		.003			
9	40.10	15.27	10.13	1.85	4.59	12.08	4.78	3.34	2.93		0.23	3.64	0.87	0.08		99.89	2.91
A2. II	.668	.150	.063	.026	.115	.216	.077	.035				.046	.006	.001			
10	39.97	17.30	7.41	3.05	3.82	10.53	5.14	3.56	4.11		0.33	3.34	0.84	0.09		99.89	2.86
A1. I	.666	.170	.046	.043	.096	.187	.083	.038				.042	.006	.001			
11	39.30	13.66	7.42	4.45	4.46	11.37	5.78	1.44	4.53		0.15	3.62	0.85	0.08		99.76 0.11	2.79
A1. I	.655	.134	.046	.062	.112	.203	.093	.016				.045	.006	.001		99.65	

RANG 3. ALKALICALCIC. ETINDASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	36.40	12.94	8.27	4.59	11.44	14.46	0.97	3.01	2.36		3.94	0.42	1.04			99.84	
A2. II	.607	.127	.052	.064	.286	.258	.016	.032				.005	.007				

ORDER 7. LENFELIC. KAMERUNARE—Continued.

SUBRANG 4. DOSODIC. KAMERUNOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 12.2 di 27.8 an 16.4 ol 4.5 lc 7.0 mt 6.7 ne 20.4	Gordon's Butte, Crazy Mountains, Montana.	E. A. Schneider.	J. E. Wolff, B. U. S. G. S., 150, p. 201, 1898.	Theralite.	Sum low. Properly in malignose, if TiO$_2$ were determined.
	or 11.7 di 25.3 ab 1.6 wo 9.7 an 14.7 mt 8.8 ne 18.7 il 8.0 ap 1.2	Monchique, Serra de Monchique, Portugal.	Singhof.	K.-Koschlau and Hackmann, T. M. P. M., XVI, p. 237, 1896.	Basic segregation in nephelite-syenite.	
	or 20.6 di 24.4 ab 8.9 ol 4.7 an 5.8 mt 6.7 ne 24.4 il 3.4 ap 1.0	Heum, Laugendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 91, 1898.	Heumite.	Near malignose.
	or 13.3 di 29.5 ab 5.8 ol 6.4 an 8.1 mt 5.3 ne 26.7 il 3.2	Kjöse Aklungen, Laugendal, Norway.	O. Heidenreich.	W. C. Brögger, Eg. Kg., III, p. 65, 1898.	Farrisite.	
	or 15.0 di 18.7 ab 4.2 wo 14.7 an 10.3 mt 7.4 ne 19.0 il 5.9 ap 0.7	Kiechlingsberg, Kaiserstuhl, Baden.	K. Gruss.	K. Gruss, Mt. Bad. G. L-A., IV, p. 113, 1900.	Monchiquite.	
	or 5.6 di 30.4 an 14.5 ol 2.6 lc 5.2 mt 6.3 ne 21.6 il 2.0 hm 4.3 ap 5.3	Löbauer Berg, Saxony.	J. Stock.	J. Stock, T. M. P. M., IX, p. 466, 1888.	Nephelite-dolerite.	
	or 10.6 di 47.1 ab 7.3 wo 6.1 an 5.0 mt 4.6 ne 19.3 il 1.4	Poutelitschorr, Umptek, Kola, Finland.	H. Berghell.	V. Hackman, Fennia, XI, No. 2, p. 193, 1894.	Augite-porphyrite.	Sum high.
	or 10.0 di 39.3 ab 6.8 ol 3.4 an 11.7 mt 5.3 ne 19.0 il 5.5	Kunjokthal, Kola. Finland.	F. Eichleiter.	F. Eichleiter, Vh. G. R.-A. Wien, XXVII, p. 217, 1893.	Theralite.	Sum high. Also in V. Hackman, Fennia, XI, No. 2, p. 168, 1894.
	or 12.8 di 24.9 an 10.6 wo 2.7 lc 5.2 il 4.0 ne 21.9 hm 10.1 pf 2.7 ap 2.0	Etinde Volcano, Kamerun, Africa.	M. Dittrich.	E. Esch, Sb. Berl. Akad., 1901, p. 299.	Leucite-nephelinite.	
X 0.20 SO$_3$ 0.06 Cl 0.14	or 10.0 di 20.7 an 13.6 wo 2.5 lc 8.7 il 6.5 ne 23.6 hm 7.4 ap 1.9	Etinde Volcano, Kamerun, Africa.	M. Dittrich.	E. Esch, Sb. Berl. Akad., 1901, p. 299.	Leucite-nephelinite.	
SO$_3$ 2.17 Cl 0.48	Q 3.3 di 24.2 or 8.9 wo 1.4 an 16.[illegible] mt 3.9 so 6.9 il 6.9 no 18.2 hm 4.6 ap 2.0	Etinde Volcano, Kamerun, Africa.	M. Dittrich.	E. Esch, Sb. Berl. Akad., 1901, p. 299.	Hauynophyr.	

SUBRANG 2. DOPOTASSIC.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	an 22.0 di 6.9 lc 14.0 ol 18.6 ne 4.5 am 12.5 mt 12.1 il 0.8 ap 2.3	Near Hot Springs, Arkansas.	L. G. Eakins.	J. F. Kemp, A. R. Ark. G. S., 1890, p. 399, 1891.	Ouachitite.	Not fresh.

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. ETINDASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	42.51	12.85	2.67	7.52	12.00	11.83	2.75	2.15	2.96		3.46			0.83		100.53	2.905
A3. III	.709	.126	.017	.104	.300	.210	.044	.023						.012			
2	43.18	12.66	3.66	8.69	13.74	12.51	3.19	1.22	1.42				0.88			101.15	2.99
B2. III	.720	.124	.023	.121	.344	.223	.051	.013					.006				
3	41.67	11.39	4.81	9.72	12.37	11.23	3.57	1.06	2.57				1.39			99.78	2.42
A3. III	.695	.112	.030	.136	.309	.200	.058	.011					.010				
4	41.68	17.98	5.40	8.42	7.40	11.84	4.28	2.07	1.09			1.21	trace			101.37	3.015
C2. IV	.695	.176	.034	.117	.185	.211	.069	.022				.015	—				
5	39.33	15.26	6.36	5.99	9.78	14.52	3.47	1.53	2.54		0.12	1.01	0.93			100.84	3.082
B2. III	.656	.150	.040	.083	.245	.259	.056	.016				.012	.006				
6	39.37	16.50	2.28	7.97	4.48	10.22	4.73	3.38	4.77		0.64	3.31	0.13	0.06		100.07	2.82
A1. I	.656	.162	.014	.111	.112	.164	.076	.036				.041	.001	.001			

RANG 3. ALKALICALCIC. ETINDASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	40.73	20.70	4.26	8.38	5.32	10.78	7.28	0.60	2.00		trace	0.46	0.49	trace		101.00	3.141
B2. III	.679	.203	.027	.117	.133	.193	.118	.006			—	.006	.003	—			

CLASS III. SALFEMANE.

RANG 1. PERALKALIC. CHOTASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	46.51	11.86	7.59	4.39	4.73	7.41	2.39	8 71	2.45	1.10	none	0.83	0.80	0.22	0.50	99.78	
A1. I	.775	.115	.047	.061	.118	.132	.038	.092				.010	.006	.003	.003		

RANG 2. DOMALKALIC. ALBANASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	45.99	17.12	4.17	5.38	5.30	10.47	2.18	8.97	0.45			0.37		trace	0.25	100.65	
A2. II	.767	.168	.026	.075	.133	.187	.035	.095				.005		—	.002		

RANG 2. DOMALKALIC. ALBANASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	36.36	11.67	6.62	5.36	13.58	9.48	3.59	3.74	—	—		6.18	trace			99.61	3.078
A2. II	.606	.115	.041	.075	.340	.169	.058	.039				.077	—				

ORDER 7. LENFELIC. KAMERUNARE—Continued.

SUBRANG 4. DOSODIC. ETINDOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	an 16.4 di 31.3 lc 10.0 ol 18.8 ne 12.5 am 1.2 mt 3.9	Grainbank, Kirkwall, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edinb., XXXIX, p. 891, 1900.	Monchiquite.	Not fresh.
	or 2.8 di 32.0 an 16.7 ol 23.1 lc 3.5 mt 5.3 ne 14.5 ap 2.0	Ibrakuppe, Oberaula, Hesse.	H. Wolff.	H. Wolff, cf. N. J., 1891, II, p. 279.	Nephelite-basalt.	Sum high.
	or 6.1 di 27.7 ab 4.2 ol 22.8 an 12.0 mt 7.0 ne 14.2 ap 3.3	Döhnberg, Oberaula, Hesse.	H. Wolff.	H. Wolff, cf. N. J., 1891, II, p. 279.	Nephelite-basalt.	Nearly in dofemane.
	an 23.6 di 23.2 lc 9.6 ol 11.6 ne 19.6 am 2.5 mt 7.9 il 2.3	Paudler's Berg, Güntersdorf, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XV, p. 247, 1896.	Basalt.	Sum high.
	an 21.7 di 18.6 lc 7.0 ol 14.1 ne 15.9 am 7.7 mt 9.3 il 1.8 ap 2.0	Grosswohlen, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XVII, p. 49, 1897.	Nephelite-basalt.	
SO_3 2.14 Cl 0.09	or 12.2 di 19.7 an 21.4 ol 6.6 lc 6.1 mt 3.2 no 18.0 il 6.3	Etinde Volcano, Kamerun, Africa.	M. Dittrich.	E. Esch, Sb. Berl. Akad., 1901, p. 299.	Hauynophyre.	

SUBRANG 5. PRESODIC.

Cl trace S trace NiO trace	an 21.9 di 23.9 lc 2.6 ol 9.6 ne 33.5 mt 6.3 il 0.9 ap 1.1	Volkersberg, n. Brückenau, Rhöngebirge.	H. Lenk.	H. Lenk, Vh. Ph. Ges. Wurzb., XXI, p. 76, 1887.	Nepholite-basalt.	Sum high. Al_2O_3 high? Alkalies?

ORDER 8. FELDOLENIC. BOHEMARE.

SUBRANG 2. DOPOTASSIC. CHOTOSE.

SO_3 0.05 Cl 0.04 F trace Cr_2O_3 none NiO 0.04 SrO 0.16	or 7.8 ac 6.9 lc 34.0 di 25.1 ne 10.8 ol 2.5 mt 7.4 il 1.5 ap 1.9	Bearpaw Peak, Bearpaw Mountains, Choteau County, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., II, p. 147, 1896.	Leucitite.	Contains traces of CoO, CuO, and Li_2O. Complete in B, U.S.G.S., 148. p. 157, 1897.

SUBRANG 2. DOPOTASSIC. ALBANOSE.

SrO none	an 10.6 di 12.0 lc 41.4 ol 9.7 ne 9.9 am 9.7 mt 6.0 il 0.8	Capo di Bove, Alban Hills, Italy.	H. S. Washington.	H. S. Washington, A. J. S., IX, p. 53, 1900.	Leucitite.	Near vesuvose.

SUBRANG 3. SODIPOTASSIC.

Cr_2O_3 2.93	an 5.0 di 5.3 lc 17.0 ol 22.1 ne 16.5 an 10.2 il 8.6 cm 4.3 hm 6.6 pf 2.6	Neuhöwen, Hegau, Baden.	U. Grubenmann.	U. Grubenmann, In. Diss. Zürich, 1886, p. 28.	Melilite-basalt.	Dried before analysis. Ignition=2.01.

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. ALBANASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	41.75	17.04	6.35	3.41	4.71	14.57	6.17	3.98	0.62	0.28	none	0.58	1.09	trace	none	100.60	3.084
A1. I	.696	.167	.040	.047	.118	.260	.098	.042				.007	.008	—	—		26°
2	38.93	15.41	5.10	4.24	5.57	16.49	5.27	1.78	5.20			1.62	0.35	trace		100.57	
A1. I	.649	.151	.032	.059	.139	.294	.085	.019				.020	.002	—			
3	43.18	15.24	7.61	2.67	5.81	10.63	5.68	4.07	3.57							99.40	2.93
B3. IV	.720	.149	.048	.038	.145	.189	.092	.043									
4	42.68	17.90	2.45	7.22	8.48	9.78	5.91	3.63	3.02							101.07	2.81
B3. IV	.711	.175	.015	.100	.212	.175	.095	.038									
5	40.15	17.32	7.25	4.00	4.43	11.78	5.99	3.78	1.18		0.15	3.21	0.71	0.08		100.38	3.01
A1. I	.669	.170	.045	.056	.111	.210	.097	.040				.040	.005	.001			
6	38.39	12.64	7.40	6.15	6.46	14.17	4.35	2.44	1.62		0.23	4.44	1.16			100.31	3.10
A1. I	.640	.124	.046	.086	.162	.253	.070	.026				.056	.008				
7	39.64	16.98	6.61	9.31	6.65	10.58	5.95	3.09	1.32							100.13	
A3. III	.661	.166	.041	.129	.166	.189	.096	.033									

RANG 2. DOMALKALIC. ALBANASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	46.15	13.25	1.29	8.54	7.82	13.89	5.77	0.93	2.01		trace	0.36	0.15	0.22		100.37	
A2. II	.769	.130	.008	.119	.196	.248	.093	.010				.004	.001	.003			

CLASS III. SALFEMANE.

RANG 1. PERALKALIC. IJOLASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	42.65	9.14	5.13	1.07	10.89	12.36	0.90	7.99	2.18	2.04		1.64	1.52	0.12	0.89	100.11 0.20	2.857
A1. I	.711	.090	.032	.017	.272	.220	.014	.085				.020	.011	.002	.006	99.91	22°

RANG 1. PERALKALIC. IJOLASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	43.70	19.77	3.35	3.47	3.94	10.30	9.78	2.87	0.89			0.89	1.34	trace		100.30	
A2. II	.728	.195	.021	.049	.099	.184	.158	.030				.011	.009	—			
2	43.50	14.60	5.40	8.28	6.16	8.70	7.34	2.95	2.50			0.10	trace			99.90	2.94
A2. II	.725	.143	.034	.115	.154	.155	.118	.032				.001	—				

RANG 1. PERALKALIC. IJOLASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	42.07	18.68	1.68	4.39	3.53	10.83	11.00	1.87	1.20		0.60	1.00	2.44			99.66	
A2. II	.701	.185	.011	.061	.088	.193	.177	.020				.012	.017				

ORDER 8. FELDOLENIC. BOHEMARE—Continued.

SUBRANG 4. DOSODIC. COVOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 S	0.05 none	an 7.5 lc 18.3 ne 27.8	di 12.6 wo 10.3 ol 4.2 am 6.1 mt 9.3 il 0.8 ap 2.6	Below Dr. Thornton's, Magnet Cove, Arkansas.	H. S. Washington.	H. S. Washington, B. G. S. A., XI, p. 399, 1900.	Ijolite.	Complete in J. G. IX, p. 618, 1901.
Cl FeS_2 SrO Li_2O	0.02 0.89 trace trace	an 13.1 lc 8.3 ne 24.1	di 6.8 wo 11.8 ol 8.4 am 11.2 mt 7.4 il 3.1 ap 0.8	Baptist Church, Magnet Cove, Arkansas.	J. F. Williams.	J. F. Williams, A. R. Ark. G. S. 1890, II, p. 226, 1891.	Nephelite-syenite (Cove type).	Biotite-ijolite, H. S. W., B. G. S. A., XI, p. 400, 1900.
SO_3 Cl	0.94 none	or 7.8 an 7.2 lc 12.6 ne 15.9 no 8.4	di 31.4 wo 2.1 mt 8.8 hm 1.6	Martinsdale, Crazy Mountains, Montana.	Not stated.	J. E. Wolff, N. Transc. Surv., p. 10, 1885.	Theralite. (Rosenbusch.)	
		an 11.7 lc 16.6 ne 27.0	di 11.0 ol 19.6 am 8.5 mt 3.5	Kronberg, Schorbach, Hesse.	H. Wolff.	H. Wolff, Cf. N. V. 1891, II, p. 279.	Nephelite-basanite.	Sum high.
ZrO_2	0.35	an 9.2 lc 17.4 ne 27.5	di 18.0 wo 5.7 ol 1.9 am 2.8 mt 3.7 il 6.2 hm 4.6 ap 1.7	Etinde Volcano, Kamerun, Africa.	M. Dittrich.	E. Esch, Sb. Berl. Akad., 1901, p. 415.	Nephelinite.	
SO_3 Cl	0.47 0.37	an 10.8 lc 11.3 ne 9.1 so 4.9 no 4.1	di 32.4 wo 2.9 ol 0.9 am 1.2 mt 7.0 il 8.6 hm 2.5 ap 2.6	Etinde Volcano, Kamerun, Africa.	M. Dittrich.	E. Esch, Sb. Berl. Akad., 1901, p. 299.	Nephelinite.	
		an 10.3 lc 14.4 ne 27.3	di 4.1 ol 19.9 am 14.5 mt 9.5	Praya, Cape Verde Islands.	F. Kertscher.	F. Eigel, T. M. P. M., XI, p. 98, 1890.	Teschenite.	

SUBRANG 5. PERSODIC.

S	trace	or 1.1 an 7.5 lc 3.5 ne 26.4	di 49.9 ol 7.2 mt 1.9	Grenada, West Indies.	J. B. Harrison.	J. B. Harrison, Rocks of Grenada, London, 1896, p. 10.	Augite-andesite with olivine.	Analysis does not correspond with description.

ORDER 9. PERLENIC. FINNARE.

SUBRANG 2. DOPOTASSIC. MADUPOSE.

SO_3 Cl F Cr_2O_3 Ce_2O_3 SrO	0.58 0.03 0.47 0.07 0.11 0.33	lc 37.1 no 3.5	di 22.6 ol 11.7 am 8.2 il 2.7 hm 5.1 ap 3.7 ft 0.7	Pilot Butte, Leucite Hills, Wyoming.	W. F. Hillebrand.	W. Cross, A. J. S., IV, p. 130, 1897.	Madupite.	

SUBRANG 4. DOSODIC. IIVAAROSE.

		or 4.4 an 1.9 lc 9.6 ne 44.9	di 25.6 wo 3.7 mt 4.9 il 1.7 ap 3.0	Iivaara, Kuuosamo, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Finl., No. 11, p. 17, 1900.	Ijolite.	
Cl Cr_2O_3	0.37 trace	or 3.3 lc 11.3 ne 27.8 so 5.0	ac 0.9 di 35.3 ol 6.7 mt 7.4	Bondi, New South Wales.	J. M. Curran.	J. M. Curran, Proc. R. Soc. N. S. W., XXVIII, p. 225, 1894.	Basalt.	Na_2O high. cf. G. W. Card Rec. G. S. N, S. W., VII, Pt. 2, p. 95, 1902.

SUBRANG 5. PERSODIC. IJOLOSE.

		lc 8.7 ne 46.9	ac 5.1 di 23.0 ol 3.1 am 3.6 il 1.8 ap 5.6	Iiwaara, Kuuosamo, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Finl., No. 11, p. 17, 1900.	Ijolite.	

CLASS IV. DOFEMANE. SUBCLASS I. P+O+M EXTREME OVER A.

RANG 1. PERMIRLIC. MINNESOTASE. SECTION 1. PERMIRIC. MINNESOTIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	50.64	7.93	1.41	14.82	18.58	3.41	0.96	0.21	0.87			0.82	0.27	0.16		100.13	
A2. II	.844	.077	.009	.206	.465	.061	.013	.002				.010	.002	.002			
2	46.96	14.13	0.76	14.95	15.97	2.32	0.35	1.68	1.26	0.07		0.62	0.03	0.93		100.09	3.193
A1. I	.783	.138	.005	.208	.400	.041	.006	.018				.007	—	.013			
3	51.83	7.98	1.48	8.28	24.10	5.26	0.35	0.06	0.29			0.29	0.09	trace		100.43	
A1. I	.864	.078	.009	.115	.603	.094	.006	.001				.004	.001	—			
4	53.05	8.91	3.26	9.52	14.42	6.76	0.66	0.48	0.65			1.77	0.09	0.08		99.65	3.09
A2. II	.884	.087	.020	.133	.361	.121	.011	.005				.022	.001	.001			

CLASS IV. DOFEMANE.

RANG 1. PERMIRLIC. SECTION 2. DOMIRIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	48.63	5.32	2.91	3.90	21.79	13.04	0.34	0.23	2.81		trace	0.47	0.21	0.12	trace	100.13	
A1. I	.811	.052	.018	.054	.545	.233	.005	.002			.006	.002	.002	—			

RANG 1. PERMIRLIC. SECTION 2. DOMIRIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	48.91	8.81	1.04	9.52	15.19	14.69	0.64	0.10	0.52	0.07		0.37	trace	0.16		100.17	
A1. I	.815	.086	.007	.133	.380	.262	.010	.001				.005	—	.002			
2	46.06	10.01	3.17	5.61	14.74	10.55	1.31	5.14	1.44			0.73	0.21	trace	0.32	99.57	
A1. I	.768	.098	.020	.078	.369	.188	.021	.055				.009	.002	—	.002		
3	42.83	10.92	4.33	8.82	14.02	13.20	3.24	0.64	1.80	——	none	0.05	0.39	0.12		100.36	
A2. II	.714	.107	.027	.122	.351	.235	.052	.007				.001	.003	.002			
4	42.06	12.18	2.67	7.89	11.47	11.29	5.10	1.07	3.08			1.93	0.34			100.05	2.968
A1. I	.701	.119	.017	.110	.287	.201	.082	.012				.024	.002				

CLASS IV. DOFEMANE.

RANG 1. PERMIRLIC. WEHRLASE. SECTION 1. PERMIRIC. WEHRLIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	43.70	11.20	3.90	6.15	25.60	7.07	0.52	0.31	2.80							101.25	
B3. IV	.728	.110	.024	.086	.640	.127	.008	.003									

RANG 1. PERMIRLIC. WEHRLASE. SECTION 1. PERMIRIC. WEHRLIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	48.95	5.69	1.20	12.11	23.49	5.33	1.58	0.79	0.18			0.81	0.12	0.08	trace	100.54	3.37
A1. I	.816	.055	.007	.168	.587	.094	.026	.009				.010	.001	.001	—		
2	46.13	4.69	0.73	16.87	25.17	4.41	0.08	trace	1.38			0.73	0.07	trace	trace	100.63	3.35
A1. I	.769	.046	.004	.234	.629	.078	.001	—				.009	—	—	—		
3	46.0	6.8	3.0	7.5	23.9	8.1	0.8	0.9	2.4							99.6	3.15
A3. III	.767	.067	.019	.104	.598	.144	.013	.010									
4	42.87	10.93	3.44	10.14	16.27	9.11	0.92	0.13	2.87	0.57	2.70	trace	trace	trace		99.95	2.88
A3. III	.715	.107	.021	.140	.407	.161	.014	.001				—	—	—			

ORDER 1. PERPOLIC. HUNGARARE. SECTION 1. PERPYRIC. MINNESOTIARE.

SUBRANG 2. DOMAGNESIC. COOKOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cr_2O_3	0.05	or 1.1 ab 6.8 an 17.2	hy 66.5 ol 3.4 mt 2.1 il 1.5	New Braintree, Massachusetts.	L. G. Eakins.	B. K. Emerson, B. U. S. G. S., 148, p. 77, 1897.	Wehrlite.	
Cr_2O_3 NiO	trace 0.06	or 10.0 ab 3.1 an 11.4 C 7.5	hy 57.5 ol 6.0 mt 1.2 il 1.1	Gunflint Lake, Cook County, Minnesota.	H. N. Stokes.	W. S. Bayley, J. G., III, p. 10, 1895.	Hypersthene-gabbro.	
Cr_2O_3 NiO	0.31 0.11	or 0.5 ab 3.1 an 19.7	di 5.1 hy 61.1 ol 7.6 mt 2.1	Meadow and Granite creeks, Madison County, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 658, 1895.	Pyroxenite.	Igneous?
		Q 8.6 or 2.8 ab 5.8 an 19.7	di 11.1 hy 42.8 mt 4.6 il 3.4	Eriyur, South Arcot, India.	P. Brühl.	T. H. Holland, Rec. G. S. Ind., XXX, p. 28, 1897.	Augite-norite.	Nearly in salfemane.

ORDER 1. PERPOLIC. HUNGARARE. SECTION 2. DOPYRIC.

SUBRANG 1. PERMAGNESIC. BELCHEROSE.

Cr_2O_3	0.36	or 1.1 ab 2.6 an 12.5	di 41.7 hy 21.9 ol 11.7 mt 5.1	Belchertown, Massachusetts.	L. G. Eakins.	B. K. Emerson, M. U. S. G. S., XXIX, p. 347, 1898.	Cortlandite.	

SUBRANG 2. DOMAGNESIC.

Cr_2O_3 Li_2O	0.15 trace	ab 5.2 an 21.1	di 42.0 hy 16.2 ol 12.3 mt 1.6 il 0.8	Orange Grove, Baltimore County, Maryland.	W. F. Hillebrand.	G. H. Willams, 15 A. R. U. S. G. S., p. 674, 1895.	Olivine-gabbro.	
SO_3 Cl SrO	0.05 0.03 0.20	or 1.1 an 6.1 lc 23.1 ne 6.0	di 37.4 ol 17.7 mt 4.6 il 1.2	Shonkin Creek, Highwood Mountains, Montana.	E. B. Hurlbut.	Weed and Pirsson, A. J. S., II, p. 321, 1896.	Missourite.	Near albanose.
S	trace	an 13.3 lc 3.1 ne 14.8	di 41.7 ol 20.0 mt 6.3	Grenada, West Indies.	J. B. Harrison.	J. B. Harrison, Rocks of Grenada, London, 1896, p. 10.	Olivine-basalt.	Dried at 100°.
X S	0.88 0.09	an 7.0 lc 5.2 ne 23.3	di 38.3 ol 13.9 am 0.5 mt 3.9 il 3.7	Hahn, Habichtswald, Cassel, Hesse-Nassau.	P. Jannasch.	F. Rinne, Sb. Berl. Akad., 1889, p. 1026.	Limburgite.	

ORDER 1. PERPOLIC. HUNGARARE. SECTION 3. PYROLIC. HUNGARIARE.

SUBRANG 1. PERMAGNESIC.

		or 1.7 ab 4.2 an 27.5	di 6.2 hy 15.6 ol 37.3 mt 5.6	Etang de l'Estagnet, Pyrenees, France.	A. Pisani.	A. Lacroix, B. S. C. G. Fr., XI, No. 71, p. 31, 1900.	Peridotite.	Sum high.

SUBRANG 2. DOMAGNESIC. WEHRLOSE.

Cr_2O_3 NiO	0.05 0.16	or 5.0 ab 13.6 an 5.6	di 16.5 hy 18.5 ol 37.6 mt 1.6 il 1.5	Red Bluff, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 652, 1895.	Wehrlite.	
S Cr_2O_3 NiO	0.24 0.04 0.09	ab 0.5 an 12.5	di 7.6 hy 44.8 ol 30.4 mt 0.9 il 1.2	North Meadow Creek, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 655, 1895.	Hornblende-picrite.	Nearly in perfemane.
Cr_2O_3	0.2	or 5.6 ab 6.8 an 12.2	di 22.0 hy 10.3 ol 35.7 mt 4.4	Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Peridotite?	
		or 0.6 ab 7.3 an 25.6	di 15.4 hy 16.0 ol 24.1 mt 4.9	Ty Croes, Anglesey, Wales.	J. A. Phillips.	T. G. Bonney, Q. J. G. S., XXXIX, p. 254, 1883.	Hornblende-picrite.	Not fresh.

CLASS IV. DOFEMANE—Continued.

RANG 1. PERMIRLIC. WEHRLASE. SECTION 2. DOMIRIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	44.99	5.91	3.42	8.30	21.02	8.79	0.91	0.74	3.19	0.63	trace	0.97	0.05	trace		99.17	
B1. II	.750	.058	.021	.115	.526	.157	.014	.008				.012	—	—			
2	50.44	8.18	1.06	6.29	17.63	11.55	2.98	0.50	0.92	0.07				0.21		100.31	
A2. II	.841	.080	.007	.088	.441	.206	.048	.006						.003			
3	47.75	10.56	0.74	8.34	19.09	9.62	1.32	0.12	2.06	0.05		0.37	0.03	0.10	none	100.46	
A1. I	.796	.104	.004	.115	.477	.171	.021	.001				.005	—	.001	—		
4	48.29	10.00	2.93	5.46	17.22	11.80	2.78	0.45	1.95							100.88	
A3. III	.805	.098	.018	.076	.431	.210	.045	.005									
5	48.15	9.52	2.98	5.46	17.42	11.91	2.34	0.40	2.35							100.53	
A3. III	.803	.093	.019	.076	.436	.212	.038	.004									

CLASS IV. DOFEMANE.

RANG 1. PERMIRLIC. CORTLANDTASE. SECTION 1. PERMIRIC. CORTLANDTIASE.

1	39.20	4.60	3.45	6.15	31.65	3.23	0.42	0.14	9.38	0.50		0.52	trace	0.20		100.15	
A1. I	.653	.045	.022	.086	.791	.057	.006	.001				.006	—	.003			

RANG 1. PERMIRLIC. CORTLANDTASE. SECTION 1. PERMIRIC. CORTLANDTIASE.

1	46.03	9.27	2.72	9.94	25.04	3.53	1.48	0.87	0.64				0.17	0.40		100.09	
A3. III	.767	.091	.017	.139	.626	.062	.024	.009					.001	.006			

RANG 1. PERMIRLIC. CORTLANDTASE. SECTION 2. DOMIRIC.

1	40.31	12.24	5.77	10.92	9.10	12.12	7.52	1.08	0.29		trace	0.89	0.45	trace		100.69	3.114
A2. II	.672	.120	.036	.151	.227	.216	.121	.012				.011	.003	—			4°

CLASS IV. DOFEMANE.

RANG 1. PERMIRLIC. LHERZASE. SECTION 1. PERMIRIC. LHERZIASE.

1	41.50	6.93	2.19	6.69	35.90	5.80	1.37	0.30	0.32					trace		101.00	
A3. III	.692	.068	.014	.093	.898	.103	.022	.003						—			

RANG 1. PERMIRLIC. LHERZASE. SECTION 1. PERMIRIC. LHERZIASE.

1	39.25	5.39	2.60	8.90	33.72	4.55	1.18	0.60	2.83			0.77				99.79	
A3. III	.654	.053	.016	.124	.843	.081	.019	.006				.010					

RANG 1. PERMIRLIC. LHERZASE. SECTION 3. CALCIMIRIC. VENANZIASE.

1	41.43	9.80	3.28	5.15	13.40	16.62	1.64	7.40	1.11			0.29	none			100.12	2.758
A2. II	.691	.096	.021	.072	.335	.296	.026	.079				.004	—				

ORDER 1. PERPOLIC. HUNGARARE. SECTION 3. PYROLIC. HUNGARIARE—Continued.

SUBRANG 2. DOMAGNESIC. ROSSWEINOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cr_2O_3 0.25 NiO none	or 4.4 di 26.8 ab 7.3 hy 12.8 an 10.0 ol 26.9 mt 4.9 il 1.8	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, J. G., VI, p. 386, 1898.	Peridotite.	Also in M. U. S. G. S., XXXVI, p. 259, 1899.
Cr_2O_3 0.48	or 3.3 di 40.2 ab 16.8 ol 25.3 an 7.2 mt 1.6 ne 4.0	Knoxville, California.	W. H. Melville.	G. F. Becker, M. U. S. G. S., XIII, p. 101, 1888.	Pseudo-diorite.	
Cr_2O_3 0.24 NiO 0.07 SrO trace Li_2O trace	or 0.6 di 19.8 ab 11.0 hy 16.3 an 22.8 ol 25.8 mt 0.9 il 0.8	Cathay Hill, Mariposa County, California.	W. F. Hillebrand.	H. W. Turner, 17 A. R. U. S. G. S., I., p. 694, 1896.	Diabase?	
	or 2.8 di 35.7 ab 13.1 ol 24.1 an 13.3 mt 4.2 ne 5.7	Etzdorf, Rosswein, Saxony.	Sachsse and Becker.	Sachsse and Becker. Cf. N. J., 1893, II, p. 503.	Gabbro.	
	or 2.2 di 35.4 ab 14.7 ol 24.5 an 14.2 mt 4.4 ne 2.8	Etzdorf, Rosswein, Saxony.	Sachsse and Becker.	Sachsse and Becker. Cf. N. J., 1893, II, p. 503.	Gabbro.	

ORDER 1. PERPOLIC. HUNGARARE. SECTION 4. DOMOLIC.

SUBRANG 1. PERMAGNESIC. CORTLANDTOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cr_2O_3 0.41 NiO 0.30 Li_2O trace	or 0.6 di 4.4 ab 3.1 hy 16.8 an 10.6 ol 47.9 mt 5.1 il 0.9	Ilchester, Howard County, Maryland.	W. F. Hillebrand.	G. H. Williams, 15 A. R. U. S. G. S., p. 674, 1895.	Cortlandtite.	Not fresh.

SUBRANG 2. DOMAGNESIC. CUSTEROSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 5.0 hy 16.7 ab 12.6 ol 44.3 an 16.1 mt 3.9 ap 0.4	Cottonwood Gulch, Silver Cliff, Custer County, Colorado.	L. G. Eakins.	W. Cross, Pr. Colo. Sci. Soc., II, p. 245, 1887.	Peridotite.	Also in 17 A. R. U. S. G. S., II, p. 284, 1896.

SUBRANG 3. MAGNESIFERROUS.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cl trace S trace Cr_2O_3 trace	lc 5.2 ac 6.0 ne 30.7 di 6.8 ol 26.0 am 17.7 mt 5.3 il 1.7 ap 1.1	Dreistelz, Rhöngebirge.	H. Lenk.	H. Lenk, Vh. Ph. Ges. Wurzb., XXI, p. 60, 1887.	Nephelite-basalt.	

ORDER 1. PERPOLIC. HUNGARARE. SECTION 5. PEROLIC. PYRENIARE.

SUBRANG 1. PERMAGNESIC. LHERZOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cr_2O_3 trace	an 12.0 di 4.3 lc 1.3 ol 69.3 ne 6.2 am 4.0 mt 3.2	Caussou, Pyrenees.	Brunet.	A. Lacroix, cf. N. J., 1895, II, p. 267.	Lherzolite.	Sum high.

SUBRANG 2. DOMAGNESIC. ARGEINOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	an 7.8 di 7.3 lc 2.6 ol 66.6 ne 5.4 am 1.9 mt 3.7 il 1.5	Argein, Pyrenees.	A. Pisani.	A. Lacroix, C. R., VIII. Cong. G. Int., p. 833, 1901.	Hornblende-peridotite.	

SUBRANG 2. DOMAGNESIC. VENANZOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	kp 25.0 ac 4.2 ne 4.8 ol 32.3 am 29.8 mt 2.8 il 0.6	San Venanzo, Umbria, Italy.	H. Rosenbusch.	H. Rosenbusch, Sb. Berl. Akad. 1899, p. 113.	Euktolite. (Venanzite.)	Cf. A. J. S., VII, p. 399, 1899.

CLASS IV. DOFEMANE—Continued.

RANG 1. PERMIRLIC. SECTION 2. DOMIRIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	40.2	9.5	9.7	12.2	8.0	13.1	0.8	0.2	0.5			4.7		0.40		99.7	3.36
A3. III	.670	.093	.060	.170	.200	.234	.013	.002				.059		.006			

RANG 1. PERMIRLIC. SECTION 3. CALCIMIRIC. BRANDBERGIASE.

1	43.17	9.93	8.78	6.88	6.80	20.96	1.77	0.16	0.31			1.56				100.30	3.28
A3. III	.720	.097	.055	.096	.170	.374	.029	.002				.019					
2	45.05	6.50	3.83	7.69	12.07	18.82	0.94	0.78	2.40			2.65	0.15			100.88	
A3. III	.751	.064	.024	.107	.302	.336	.015	.009				.033	.001				
3	39.43	10.36	13.19	3.98	5.53	15.50	4.23	2.24	0.81			2.27	2.76	trace		100.30	3.058
A2. II	.657	.102	.082	.056	.138	.277	.068	.023				.028	.020	—			

CLASS IV. DOFEMANE.

RANG 1. PERMIRLIC. PAOLASE. SECTION 1. PERMIRIC. VALBONNIASE.

1	46.40	10.80	5.90	5.60	22.20	3.72	0.30	1.21	3.85							100.18	
A3. III	.773	.106	.036	.078	.555	.066	.005	.013									

RANG 1. PERMIRLIC. PAOLASE. SECTION 2. DOMIRIC.

1	47.41	6.39	7.06	4.80	15.34	14.32	0.69	1.40	2.10							100.00	3.30
B3. IV	.790	.063	.044	.067	.384	.256	.010	.015									15°
2	40.42	9.98	9.83	10.67	11.56	10.78	1.26	0.60	1.17	0.45		2.51	0.63	0.25	0.05	100.20	
A1. I	.674	.098	.061	.148	.289	.193	.020	.006				.031	.004	.004	—		
3	38.20	9.16	6.12	5.89	14.69	9.93	3.44	2.20			trace	7.27	trace			99.91	2.914
A2. II	.637	.090	.038	.082	.347	.177	.055	.024	—			.091	—				
4	42.68	9.42	11.55	7.23	10.09	13.15	2.71	1.16	1.06			0.51	1.29			100.85	
A2. II	.711	.092	.066	.100	.252	.235	.043	.012				.006	.009				
5	38.08	11.44	7.18	6.55	12.11	13.08	2.28	1.24	3.98			3.15	0.54			99.73	3.071
A2. II	.635	.112	.045	.091	.303	.234	.037	.014				.039	.004				
6	39.90	10.02	12.88	4.09	14.84	13.28	2.48	1.77	0.52			trace	0.82	trace		100.60	3.19
A3. III	.665	.098	.080	.057	.371	.237	.040	.020				—	.006				
7	43.76	10.90	3.49	9.82	12.76	13.80	2.21	0.31	1.00			2.32	0.51	0.32		101.20	
B2. III	.729	.107	.022	.137	.319	.246	.035	.003				.029	.004	.005			

ORDER 2. DOPOLIC. SCOTARE. SECTION 1. PERPYRIC.

SUBRANG 3. MAGNESIFERROUS.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Q 0.9 di 34.9 or 1.1 hy 10.2 ab 6.8 mt 13.9 an 21.7 il 9.1	Druin an Eidhne, Island of Skye, Scotland.	J. H. Player.	Geikie and Teall, Q. J. G. S., L., p. 653, 1894.	Gabbro, "dark band."	

SUBRANG 2. DOMAGNESIC. BRANDBERGOSE.

	or 1.1 di 42.2 ab 2.6 wo 13.5 an 18.3 mt 12.8 ne 6.8 il 2.9	Burnt Head, Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXVI, p. 340, 1900.	Gabbro-pyroxenite.	
	an 11.1 di 65.6 lc 3.9 ol 4.0 ne 4.3 mt 5.6 il 5.1	Brandberget, Gran, Norway.	L. Schmelck.	W. C. Brögger, Q. J. G. S., L., p. 31, 1894.	Pyroxenite.	
	or 12.8 di 29.9 ab 1.0 wo 8.3 an 3.1 mt 6.5 ne 18.7 il 4.2 hm 8.6 ap 6.6	Lobauer Berg, Saxony.	J. Stock.	J. Stock, T. M. P. M., IX, p. 466, 1888.	Nephelite-dolerite.	Iron oxides?

ORDER 2. DOPOLIC. SCOTARE. SECTION 2. DOPYRIC. PAOLIARE.

SUBRANG 1. PERMAGNESIC. VALBONNOSE.

	or 7.2 hy 47.9 ab 2.6 ol 9.3 an 18.3 mt 8.4 C 2.2	Vallée de Valbonne, Pyrenees.	A. Pisani.	A. Lacroix, B. S. C. G. Fr., XI, No. 71, p. 31, 1900.	Micaceous hornblendite.	

SUBRANG 2. DOMAGNESIC.

S 0.49	or 8.3 di 47.9 ab 5.2 hy 6.7 an 10.6 ol 8.6 mt 10.2	Montrose Point, Cortlandt, New York.	W. H. Emerson.	G. H. Williams, A. J. S., XXXI, p. 40, 1886.	Augite-peridotite.	Na_2O by difference.
NiO 0.02 SrO 0.02 Li_2O trace	or 3.3 di 24.2 ab 10.5 hy 8.0 an 20.0 ol 12.2 mt 13.1 il 4.8 ap 1.3	Big Timber Creek, Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, B. U. S. G. S., 148, p. 144, 1897.	Olivine-gabbro.	
Cr_2O_3 3.01	or 7.8 di 30.1 an 3.1 ol 14.5 lc 4.4 il 9.5 ne 15.6 cm 4.4 hm 6.1 pf 3.7	Höwenegg, Hegau, Baden.	U. Grubenmann.	U. Grubenmann, In. Diss. Zürich, 1886, p. 26.	Melilite-basalt.	Ignition = 0.89.
	or 6.7 di 37.1 ab 11.5 ol 8.0 an 10.3 mt 15.3 ne 6.0 il 0.9 ap 3.0	Todtenkopfchen, Rhöngebirge.	H. Sommerlad.	H. Sommerlad, N. J. B. B., II, p. 155, 1882.	Hornblende-basalt.	In Roth.
SO_3 0.10	an 17.0 di 30.7 lc 6.1 ol 11.9 ne 10.5 am 2.0 mt 10.4 il 6.0 ap 1.2	Schafruhe, Rhöngebirge.	Haefcke.	H. Proescholdt, Jb. Pr. G. L-A., XIV, p. 12, 1894.	Nephelite-basalt.	
	an 10.6 di 37.2 lc 8.7 ol 11.2 ne 11.4 am 0.8 mt 13.2 hm 3.7 ap 1.8	Löbauer Berg, Saxony.	J. Stock.	J. Stock, T. M. P. M., IX, p. 433, 1888.	Nephelite-basalt.	
	or 1.7 di 36.8 ab 7.3 ol 18.5 an 19.2 mt 5.1 ne 6.0 il 4.5 ap 1.3	Green Mountain, San Vicente, Cape Verde Islands.	C. v. John.	C. v. John, Jb. G. R-A., Wien, XLVI, p. 284, 1896.	Dolerite.	Sum high.

CLASS IV. DOFEMANE—Continued.

RANG 1. PERMIRLIC. PAOLASE. SECTION 3. CALCIMIRIC. PAOLIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	36.51	8.22	8.29	3.31	8.19	18.85	2.10	1.08	1.40			3.11		trace		99.22	
B1. II	.609	.080	.052	.046	.205	.337	.034	.012				.039		—			
2	38.39	7.05	9.07	6.17	11.58	19.01	0.74	0.75	0.33	0.14	0.32	4.54	0.82	0.32	trace	99.89	
A1. I	.640	.069	.057	.086	.290	.339	.012	.008				.057	.006	.005	—		
3	38.38	6.15	11.70	8.14	11.47	18.60	0.78	0.13	0.54	0.18	None.	4.32	0.17	0.16		100.72	
A2. II	.640	.060	.073	.113	.287	.332	.013	.001				.054	.001	.002			
4	37.62	9.86	4.22	5.94	8.41	15.42	3.33	2.32	4.41		3.55	2.79	2.05			100.84	
A2. II	.627	.097	.026	.082	.210	.275	.053	.024				.035	.015				

CLASS IV. DOFEMANE.

RANG 1. PERMIRLIC. TEXASE. SECTION I. PERMIRIC. MARQUETTIASE.

1	39.37	4.47	4.96	9.13	26.53	3.70	0.50	0.26	7.08	0.87	1.23	0.66	0.17	0.12	trace	99.94	
A1. I	.656	.044	.031	.126	.663	.066	.008	.003				.008	.001	.002	—		

RANG 1. PERMIRLIC. TEXASE. SECTION 2. DOMIRIC. UVALDIASE.

1	42.66	6.26	6.89	2.78	24.64	8.02	2.88	—	6.34							100.47	
A3. III	.711	.061	.043	.039	.616	.143	.047										

RANG 1. PERMIRLIC. TEXASE. SECTION 2. DOMIRIC. UVALDIASE.

1	40.32	9.46	4.75	7.48	18.12	10.55	2.62	1.10	1.25	0.57		2.66	0.68	0.25	0.06	100.09	3.148
A1. I	.672	.094	.030	.104	.453	.188	.042	.012				.033	.005	.004	—		19°
2	39.92	8.60	4.40	8.00	20.17	10.68	1.91	1.03	1.45	0.43		2.70	0.51	0.24	0.06	100.45	3.200
A1. I	.665	.084	.027	.111	.504	.191	.030	.011				.034	.004	.003	—		21°.5
3	38.87	11.94	4.02	6.00	15.24	10.87	2.59	1.64	—		trace	4.79	trace			99.02	2.946
B2. III	.648	.117	.025	.083	.381	.194	.042	.017				.060	—				
4	36.53	9.91	3.84	6.01	18.10	10.31	3.06	1.60	—		trace	8.38	trace			100.64	2.987
A2. II	.609	.097	.024	.083	.453	.184	.049	.017				.105	—				

ORDER 2. DOPOLIC. SCOTARE. SECTION 2. DOPYRIC. PAOLIARE—Continued.

SUBRANG 2. DOMAGNESIC. PAOLOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
X Cl FeS_2 SrO	2.10 0.03 6.03 trace	an 9.5 lc 5.2 ne 9.7	di 21.8 wo 11.4 ol 7.3 am 10.8 mt 1.9 il 5.9 hm 7.0 pr 6.0	Magnet Cove, Arkansas.	J. F. Williams.	J. F. Williams, A. R. Ark. G. S., 1890, II, p. 227, 1891.	Nephelite-syenite, dark (jacupirangite).	Not fresh. Sum low.
X ZrO_2 S	0.24 none 0.42	an 13.6 lc 3.5 ne 3.4	di 40.7 ol 7.2 am 8.4 mt 7.2 il 8.5 hm 4.2 ap 1.9	Magnet Cove, Arkansas.	H. S. Washington	H. S. Washington, J. G., IX, p. 620, 1901.	Jacupirangite.	
		an 12.8 lc 0.4 ne 3.7	di 46.3 ol 5.2 am 7.2 mt 13.7 il 8.3 hm 2.2	Jacupiranga, Sao Paolo, Brazil.	H. S. Washington.	H. S. Washington, J. G., IX, p. 620, 1901.	Jacupirangite.	
SO_3 Cl S	0.60 0.03 0.06	an 7.5 lc 10.5 ne 9.1 no 5.0	di 34.5 ol 5.1 am 3.7 mt 6.0 il 5.2 ap 4.9	Petersberg, Frankische Alp, Bavaria.	Not stated.	C. W. v. Gümbel, Geog. Besch. Fr Alp Kassel, 1891, p. 569.	Basalt.	Not fresh.

ORDER 2. DOPOLIC. SCOTARE. SECTION 3. PYROLIC. TEXIARE.

SUBRANG 2. DOMAGNESIC. MARQUETTOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cr_2O_3 SrO	0.68 trace	or 1.7 ab 4.2 an 9.2	di 7.4 hy 21.1 ol 37.5 mt 7.2 il 1.2 cm 1.0	Opin Lake, Marquette Region, Michigan.	W. F. Hillebrand.	Van Hise and Bayley, 15 A. R. U. S. G. S., p. 511, 1895.	Peridotite.	Not fresh.

SUBRANG 1. PERMAGNESIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		ab 11.5 an 3.9 ne 7.1	di 28.0 ol 34.1 mt 9.7	Supreya, N. Ural Mountains, Russia.	Kultacheff.	Loewinson-Lessing, G. Sk. Jushno-Sao. Dorpat, 1900, p. 166.	Picrite.	Not fresh.

SUBRANG 2. DOMAGNESIC. UVALDOSE.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
ZrO_2 SO_3 Cl F S NiO SrO	none 0.03 0.05 0.04 0.01 0.06 0.03	or 3.3 an 11.1 lc 2.6 ne 11.9	di 29.3 ol 26.2 mt 7.0 il 5.1 ap 1.6	Tom Munn's Hill, Uvalde County, Texas.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 62, 1900.	Nephelite-basalt.	
ZrO_2 Cl F S Cr_2O_3 V_2O_3 NiO SrO	none trace 0.07 trace 0.14 0.04 0.06 0.04	an 12.0 lc 4.9 ne 8.5	di 24.6 ol 32.1 am 2.4 mt 6.3 il 5.1 ap 1.2	Black Mountain, Uvalde County, Texas.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 63, 1900.	Nephelite-basalt.	
Cr_2O_3	3.06	an 16.1 lc 7.4 ne 11.9	di 25.0 ol 18.5 am 2.0 mt 1.2 il 8.9 cm 4.5 hm 3.2	Hohenhöwen, Hegau, Baden.	U. Grubenmann.	U. Grubenmann, In. Diss. Zürich, 1886, p. 31.	Melilite-basalt.	Sum low. Ignit. = 2.82.
Cr_2O_3	2.90	an 8.6 lc 7.4 ne 13.9	di 22.0 ol 24.6 pf 5.6 il 9.9 cm 4.3 hm 3.8	Wartenberg, Hegau, Baden.	U. Grubenmann.	U. Grubenmann, In. Diss. Zürich, 1886, p. 20.	Melilite-basalt.	Ignit. = 2.47.

CLASS IV. DOFEMANE—Continued.

RANG 1. PERMIRLIC. TEXASE. SECTION 2. DOMIRIC. UVALDIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
5	37.98	9.30	5.96	5.86	17.13	10.38	3.50	2.03	2.74		0.36	2.02	0.31	trace		100.15	3.072
A1. I	.633	.091	.037	.081	.425	.185	.056	.021				.025	.002	—			17°
6	39.47	11.26	8.74	4.98	14.33	12.08	5.04	1.86	0.63			1.56	0.99	trace		100.94	2.896
B2. III	.658	.110	.054	.070	.356	.216	.080	.020				.020	.007	—			
7	42.58	9.58	4.97	10.22	16.97	11.54	2.01	0.54	1.04			0.94	0.41	0.25		101.05	
B2. II	.710	.094	.031	.141	.424	.206	.032	.006				.012	.003	.004			

CLASS IV. DOFEMANE.

RANG 1. PERMIRLIC. CASSELASE. SECTION 1. PERMIRIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	38.78	6.85	8.83	1.99	26.34	3.88	0.78	2.56	7.85	1.95	0.14	0.89				100.84	2.728 to 2.651
B2. III	.646	.067	.055	.028	.654	.070	.013	.027				.011					
2	38.62	4.71	8.72	4.08	32.32	3.97	0.17	0.20	6.46			0.60	trace			100.28	2.931
A2. II	.644	.046	.054	.057	.808	.071	.003	.002				.007	—				

RANG 1. PERMIRLIC. CASSELASE. SECTION 1. PERMIRIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	40.12	7.76	7.35	8.66	23.69	6.53	1.20	0.53	4.03		trace	0.37	0.18			100.62	2.988
A2. II	.669	.076	.046	.121	.592	.116	.018	.006				.005	.001				

RANG 1. PERMIRLIC. CASSELASE. SECTION 2. DOMIRIC. CASSELIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	33.84	5.88	7.04	5.16	22.96	9.46	0.33	2.04	7.50	0.68	0.43	3.78	0.89	0.16	0.06	100.54	
A1. I	.564	.058	.044	.072	.574	.169	.005	.022				.047	.006	.002	—		

RANG 1. PERMIRLIC. CASSELASE. SECTION 2. DOMIRIC. CASSELIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	37.96	10.14	3.69	7.59	14.69	16.28	2.18	0.69	1.82	0.39		2.93	1.13	0.22	0.06	100.13	3.150
A1. I	.633	.099	.023	.106	.367	.291	.035	.007				.035	.008	.003	—		20°.5
2	39.16	10.06	6.54	7.71	13.74	15.30	2.38	1.46	1.55		0.58	1.52	0.75	0.11		100.86	
A2. II	.653	.099	.041	.107	.344	.273	.039	.016				.019	.005	.002			

CLASS IV. DOFEMANE.

RANG 1. PERMIRLIC. SECTION 1. PERMIRIC. KALTENIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	34.98	10.80	1.42	21.33	19.30	0.43	0.17	5.42	1.28			5.18				100.31	3.276
A3. III	.583	.106	.009	.296	.483	.007	.003	.058				.063					

ORDER 2. DOPOLIC. SCOTARE. SECTION 3. PYROLIC. TEXIARE—Continued.

SUBRANG 2. DOMAGNESIC UVALDOSE—Continued.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
X 2.40 S 0.09 SrO trace	an 3.9 di 21.6 lc 9.2 ol 25.6 ne 15.9 am 4.9 mt 8.6 il 3.9 ap 0.7	Hohenberg, Bühne, Westphalia.	Biltz.	F. Rinne, Sb. Berl. Akad., 1891, p. 988.	Melilite-nephelite basalt.	
	an 2.8 di 22.7 lc 8.7 ol 17.7 ne 22.7 am 8.1 mt 12.5 il 3.1 ap 2.2	Schafberg Plateau, Lobauer Berg, Saxony.	J. Stock.	J. Stock, T. M. P. M., IX, p. 466, 1888.	Nephelite-basalt.	
	or 3.3 di 35.5 ab 4.7 ol 27.7 an 10.0 mt 7.2 ne 6.5 il 1.8 ap 1.0	Mindello, St. Vicente, Cape Verde Islands.	C. v. John.	C. v. John, Jb. G. R-A. Wien., XLVI, p. 283, 1896.	Dolerite.	Sum high.

ORDER 2. DOPOLIC. SCOTARE. SECTION 4. DOMOLIC.

SUBRANG 1. PERMAGNESIC.

	or 15.0 di 8.9 ab 1.6 ol 42.8 an 7.5 mt 6.5 ne 2.8 il 1.7 hm 4.3	Murfreesboro, Pike County, Arkansas.	R. N. Brackett.	J. F. Williams, A. R. Ark. G. S., 1890, p. 383, 1891.	Peridotite.	Not fresh.
Cr_2O_3 0.43	or 1.1 di 6.5 ab 1.6 hy 14.6 an 11.4 ol 42.9 mt 13.4	Ehrsberg, Schwarzwald, Baden.	J. H. Kloos.	J. H. Kloos, N. J. B. B., III, p. 57, 1885.	Picrite.	Not fresh.

SUBRANG 2. DOMAGNESIC.

Cl trace FeS_2 0.20 CuO trace	or 3.3 di 14.8 ab 9.4 hy 4.6 an 14.5 ol 40.9 mt 10.7	Newton Bushel, Devonshire, England.	K. Busz.	K. Busz, N. J., 1895, I, p. 74.	Paleopicrite.	Quite fresh.

SUBRANG 1. PERMAGNESIC.

Cl 0.05 F ? Cr_2O_3 0.18 NiO 0.10 CoO trace	an 8.6 di 7.7 lc 9.6 ol 37.6 ne 1.4 am 8.5 mt 6.0 il 7.1 hm 2.9 ap 1.9	Flanary dike, Crittenden County, Kentucky.	W. F. Hillebrand.	J. S. Diller, A. J. S., XLIV, p. 288, 1892.	Mica-peridotite.	Not fresh.

SUBRANG 2. DOMAGNESIC. CASSELOSE.

ZrO_2 none SO_3 0.03 F 0.07 S 0.04 Cr_2O_3 0.08 V_2O_3 0.05 NiO 0.04 SrO 0.05	an 18.6 di 13.5 lc 3.1 ol 26.1 ne 9.9 am 13.8 mt 5.3 il 4.4 ap 2.6	Near Uvalde, Uvalde County, Texas.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 168, p. 63, 1900.	Nephelite-melilite-basalt.	
Cr_2O_3 trace	an 12.2 di 16.7 lc 7.0 ol 23.3 ne 11.1 am 13.7 mt 9.5 il 2.8 ap 1.8	Oberleinleiter, Franken Jura, Bavaria.	Not stated.	Leppla and Schwager, Geog. Jheft. Cassel, I, p. 69, 1888.	Nephelite-basalt.	

ORDER 2. DOPOLIC. SCOTARE. SECTION 5. PEROLIC.

SUBRANG 3. MAGNESIFERROUS. KALTENOSE.

SO_3 trace	an 2.2 ol 56.6 lc 20.1 mt 2.1 kp 3.8 il 9.7 ne 1.6 C 3.8	Kaltenthal, Harzburg, Harz Mountains.	Hampe.	M. Koch, Z. D. G. G., XLI, p. 165, 1889.	Biotite-peridotite.	

CLASS IV. DOFEMANE—Continued.

RANG 1. PERMIRLIC. BERGENASE. SECTION 1. PERMIRIC. BERGENIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	31.59	8.54	2.36	24.52	10.70	2.25	1.03	0.15	n. d.			18.49	0.02			99.65	
A2. II	.527	.084	.015	.340	.267	.040	.016	.002				.231	—				

CLASS IV. DOFEMANE.

RANG 1. PERMIRLIC. SECTION 2. DOMIRIC.

1	35.84	10.48	7.25	6.62	12.95	10.90	3.53	1.51	—			8.85	trace			100.77	3.051
A2. II	.597	.103	.045	.092	.324	.194	.056	.016				.111	—				

RANG 1. PERMIRLIC. SECTION 3. CALCIMIRIC. AVEZACIASE.

1	31.80	10.96	12.23	9.79	8.40	17.34	0.66	0.27	1.50			3.25	3.32			99.46	
A2. II	.580	.108	.076	.137	.210	.310	.011	.003				.041	.023				

CLASS IV. DOFEMANE.

RANG 1. PERMIRLIC. SECTION 2. DOMIRIC.

1	35.56	11.25	6.62	6.67	14.68	8.99	3.86	1.75	—			8.03	trace			100.07	3.046
A2. II	.593	110	.041	.093	.367	.177	.062	.019				.100	—				

CLASS IV. DOFEMANE.

RANG 1. PREMIRLIC. ADIRONDACKASE. SECTION 1. PREMIRIC. ADIRONDACKIASE.

1	21.42	7.03	30.34	22.81	6.92	3.59	0.53	0.41	0.95		trace	5.21	0.14	trace		99.81	
A1. I	.357	.069	.190	.317	.173	.064	.009	.004				.065	.001	—			
2	11.73	6.46	30.68	27.92	3.35	3.95	0.50	0.26	0.64		0.32	12.31	0.82			99.19	4.138
A1. I	.196	.063	.192	.388	.084	.071	.008	.003				.154	.006				

CLASS IV. DOFEMANE.

RANG 1. PERMIRLIC. CHAMPLAINASE. SECTION 1. PREMIRIC. CHAMPLAINIASE.

1	17.90	10.23	15.85	27.95	6.04	2.86	n. d.	n. d.	1.33		0.10	15.66	0.04	trace		99.15	4.138
A2. II	.298	.100	.099	.389	.151	.051	—	—				.196	—	—			
2	13.35	8.75	20.35	28.82	6.63	2.15	n. d.	n. d.	1.68		0.17	16.45	0.02			99.62	
A2. II	.223	.086	.127	.400	.166	.039	—	—				.206	—				

ORDER 3. POLMITIC. SVERIGARE. SECTION 1. PERPYRIC. BERGENIARE.

SUBRANG 3. MAGNESIFERROUS. BERGENOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	or 1.1 hy 34.6 ab 8.4 ol 3.8 an 11.1 mt 3.5 C 2.7 il 35.1	Storgang, Soggendal, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 165.	Ilmenite-norite.	

ORDER 3. POLMITIC. SVERIGARE. SECTION 2. DOPYRIC.

SUBRANG 2. DOMAGNESIC.

Cr_2O_3 2.84	or 2.2 di 27.2 an 8.6 ol 13.8 lc 5.2 cm 4.1 ne 13.9 il 11.4 pf 5.0 hm 7.3	Randen, Hegau, Baden.	U. Grubenmann.	U. Grubenmann, In. Diss. Zürich., 1886, p. 23.	Melilite-basalt.	Ignit.=1.92.

SUBRANG 3. MAGNESIFERROUS. AVEZACOSE.

	an 26.1 di 26.2 lc 1.3 ol 8.2 ne 3.1 am 2.0 mt 17.6 il 6.2 ap 7.6	Avezac-Prat, Pyrenees, France.	A. Pisani.	A. Lacroix, C. R., VIII. Cong. G., p. 832, 1901.	Avezacite.	

ORDER 3. POLMITIC. SVERIGARE. SECTION 4. DOMOLIC.

SUBRANG 2. DOMAGNESIC.

Cr_2O_3 2.66	an 8.1 di 16.6 lc 8.3 ol 20.3 ne 17.6 am 4.9 cm 4.0 il 11.6 pf 3.2 hm 6.6	Hohenstoffeln, Hegau, Baden.	U. Grubenmann.	U. Grubenmann, In. Diss. Zürich, 1886, p. 35.	Melilite-basalt.	Ignit.=1.72

ORDER 4. DOMITIC. ADIRONDACKARE. SUBORDER 2. DOHEMIC. ADIRONDACKORE.

SUBRANG 4. DOFERROUS.

Cl 0.42 S 0.04 Cr_2O_3 none Org trace	or 2.2 di 1.8 ab 4.7 hy 8.0 an 15.6 ol 12.0 mt 44.0 il 10.0	Elizabethtown, Essex County, New York.	W. F. Hillebrand.	J. F. Kemp, 19 A. R. U. S. G. S., III, p. 408, 1899.	Titaniferous iron ore.	
Cl 0.12 F trace S 0.04 V_2O_3 0.04 Org 0.05	an 14.5 ol 10.6 lc 1.3 mt 44.5 ne 2.3 il 23.7 ap 1.9	Lincoln Pond, Essex County, New York.	W. F. Hillebrand.	J. F. Kemp, 19 A. R. U. S. G. S., III, p. 407, 1899.	Titaniferous iron ore.	Sum low.

ORDER 4. DOMITIC. ADIRONDACKARE. SUBORDER 3. TILHEMIC. CHAMPLAINORE.

SUBRANG 4. DOFERROUS.

S 0.14 Cr_2O_3 0.51 V_2O_3 0.55	an 15.2 hy 16.0 C 5.0 ol 8.8 mt 23.0 il 30.1	Split Rock mine, Essex County, New York.	W. F. Hillebrand.	J. F. Kemp, 19 A. R. U. S. G. S., III, p. 402, 1899.	Titaniferous iron ore.	Sum low. Alkalies not determined.
Cl trace S 0.09 Cr_2O_3 0.55 V_2O_3 0.61 Org trace	an 10.8 hy 5.7 C 4.8 ol 14.8 mt 29.5 il 31.0	Elizabethtown, Essex County, New York.	W. F. Hillebrand.	J. F. Kemp, 19 A. R. U. S. G. S., III, p. 405, 1899.	Titaniferous iron ore.	Alkalies not determined.

CLASS V. PERFEMANE. SUBCLASS I. P+O+M EXTREME OVER A.

RANG 1. PERMIRLIC. WEBSTERASE. SECTION 1. PERMIRIC. MARICIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	51.94	2.53	2.88	9.38	25.97	3.60	none	none	2.82	—		none	none	trace		100.07	
A1. I	.866	.024	.012	.131	.649	.064	—	—				—	—	—			
2	50.10	2.00	2.38	8.68	26.85	5.06	none	none	4.16	—		none	none	0.29		100.14	
A1. I	.835	.020	.015	.121	.671	.090	—	—				—	—	.004			
3	55.23	2.08	3.94	6.25	29.29	1.68	—	—	1.12			0.44				100.03	3.297
A2. II	.921	.021	.025	.087	.732	.030						.006					

RANG 1. PERMIRLIC. WEBSTERASE. SECTION 2. DOMIRIC. WEBSTERIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	53.98	1.32	1.41	3.90	22.59	15.47	n. d.	n. d.	0.83	0.09		0.15	trace	0.21		100.48	3.301
A1. I	.900	.011	.009	.054	.565	.277						.002	—	.003			
2	52.55	2.71	1.27	4.90	20.39	16.52	0.27		1.09			0.14	trace	0.24		100.52	3.304
A2. II	.876	.022	.008	.068	.510	.295						.002	—	.003			
3	55.14	0.66	3.48	4.73	26.66	8.39	0.30	none	0.38			trace	0.23	0.03		100.36	
A1. I	.919	.005	.022	.065	.667	.150	.005	—				—	.002	—			

RANG 1. PERMIRLIC. WEBSTERASE. SECTION 2. DOMIRIC. WEBSTERIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	53.22	3.14	—	7.95	20.09	14.44	trace	trace	0.98	—		none		0.11		100.42	
A1. I	.887	.031		.111	.502	.258	—	—				—		.002			
2	53.21	1.94	1.44	7.92	20.78	13.12	0.11	0.07	0.87	0.14	0.10	0.26	trace	0.22	none	100.47	
A1. I	.887	.017	.009	.110	.520	.234	.002	.001				.003	—	.003	—		
3	53.25	2.80	0.69	5.93	19.91	16.22	0.19	trace	0.24	0.05				0.09		99.98	
A2. II	.888	.026	.004	.082	.498	.289	.003	—						.001			

CLASS V. PERFEMANE.

RANG 1. PERMIRLIC. BALTIMORASE. SECTION 1. PERMIRIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	49.42	3.37	1.30	5.75	34.97	2.11	—	—	1.84		0.76					99.68	
A3. III	.824	.032	.008	.080	.874	.038											

RANG 1. PERMIRLIC. BALTIMORASE. SECTION 2. DOMIRIC. BALTIMORIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	43.87	1.64	8.94	2.60	27.32	6.29	0.50		7.64	1.08		0.12	trace	0.19		100.63	3.022
A1. I	.731	.016	.055	.036	.683	.112	.008					.002	—	.003			

RANG 1. PERMIRLIC. BALTIMORASE. SECTION 2. DOMIRIC. BALTIMORIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	50.80	3.40	1.39	8.11	22.77	12.31	trace	trace	0.52			none	trace	0.17		100.03	3.318
A1. I	.843	.033	.009	.112	.569	.219	—	—				—	—	.002			

ORDER 1. PERPOLIC. MAORARE. SECTION 1. PERPYRIC. CAROLINIARE.

SUBRANG 1. PERMAGNESIC. MARICOSE.

Inclusive.	Norm.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.19 Cl 0.16 Cr_2O_3 0.60	Q 0.6 di 8.9 an 6.7 hy 76.4 mt 2.8	Johnny Cake Road, Baltimore County, Maryland.	J. E. Whitfield.	G. H. Williams, B. U. S. G. S., 148, p. 83, 1897.	Pyroxenite.	"Altered."
SO_3 trace Cl 0.26 Cr_2O_3 0.36	an 5.6 di 15.4 hy 63.1 ol 7.6 mt 3.5	Johnny Cake Road, Baltimore County, Maryland.	J. E. Whitfield.	G. H. Williams, B. U. S. G. S., 148, p. 83, 1897.	Pyroxenite.	"Altered."
	Q 3.7 di 2.0 an 5.8 hy 79.6 mt 5.8 il 0.9	Central Marico District, Transvaal, South Africa.	J. A. L. Henderson.	J. A. L. Henderson, In. Diss. Leipzig, p. 39, 1898.	Enstatite-pyroxenite.	

SUBRANG 1. PERMAGNESIC. WEBSTEROSE.

Cr_2O_3 0.53 NiO trace	an 3.1 di 58.3 hy 35.0 mt 2.1	Hebbville, n. Baltimore, Maryland.	T. M. Chatard.	G. H. Williams, A. G., VI, p. 42, 1890.	Websterite.	Complete in B. U. S. G. S., 148, p. 84, 1897.
Cr_2O_3 0.44	ab 1.6 di 60.7 an 5.3 hy 29.8 mt 1.9	Hebbville, n. Baltimore, Maryland.	T. M. Chatard.	G. H. Williams, A. G., VI, p. 42, 1890.	Websterite.	Complete in B. U. S. G. S., 148, p. 84, 1897.
Cr_2O_3 0.25 NiO 0.11	Q 1.7 di 32.7 ab 2.6 hy 57.1 mt 5.1	Webster, North Carolina.	E. A. Schneider.	G. H. Williams, A. G., VI, p. 44, 1890.	Websterite.	Complete in B. U. S. G. S., 148, p. 92, 1897.

SUBRANG 2. DOMAGNESIC. CECILOSE.

SO_3 trace Cl 0.26 Cr_2O_3 0.23	an 8.6 di 50.2 hy 37.8 ol 2.2	Dogwood Road, Baltimore County, Maryland.	J. E. Whitfield.	G. H. Williams, B. U. S. G. S., 148, p. 83, 1897.	Pyroxenite.	"Altered."
ZrO_2 trace FeS_2 0.03 Cr_2O_3 0.20 V_2O_3 0.03 NiO 0.03 SrO none	or 0.6 di 48.9 ab 1.0 hy 41.4 an 3.2 mt 2.1 il 0.5	Oakwood, Cecil County, Maryland.	W. F. Hillebrand.	A. G. Leonard, B. U. S. G. S., 168, p. 43, 1900.	Websterite.	
Cr_2O_3 0.54 NiO 0.07	ab 1.6 di 58.9 an 6.4 hy 28.8 ol 2.8 mt 0.9	Bagley Creek, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 406, 1891.	Pyroxenite.	

ORDER 1. PERPOLIC. MAORARE. SECTION 2. DOPYRIC. MARYLANDIARE.

SUBRANG 1. PERMAGNESIC.

NiO 0.16	an 8.9 di 1.3 hy 57.2 ol 27.6 mt 1.9	Gaggio Montano, Bologna, Italy.	P. E. V. de Regny.	P. E. V. de Regny, cf. N. J., 1900, II, p. 397.	Norite.	Alkalies?

SUBRANG 1. PERMAGNESIC.

Cr_2O_3 0.44 NiO trace	ab 4.2 di 22.6 an 2.2 hy 34.3 ol 16.3 mt 8.4 hm 3.0	Johnny Cake Road, Baltimore County, Maryland.	T. M. Chatard.	G. H. Williams, A. G., VI, p. 39, 1890.	Lherzolite.	Not fresh.

SUBRANG 2. DOMAGNESIC. BALTIMOROSE.

SO_3 trace Cl 0.24 Cr_2O_3 0.32	an 9.2 di 41.4 hy 33.8 ol 12.2 mt 2.1	Johnny Cake Road, Baltimore County, Maryland.	J. E. Whitfield.	G. H. Williams, A. G., VI, p. 41, 1890.	Pyroxenite.	

CLASS V. PERFEMANE—Continued.

RANG 1. PERMIRLIC. SECTION 1. PERMIRIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	41.43	0.04	2.52	6.25	43.74	0.55	—	—	4.41					none		99.80	
A2. II	.691	—	.015	.087	1.094	.010								—			
2	42.00	3.19	2.81	4.41	40.40	3.30	1.20	0.29	1.66					trace		101.16	
D3. IV	.700	.031	.017	.061	1.010	.059	.019	.003						—			

RANG 1. PERMIRLIC. SECTION 1. PERMIRIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	42.39	2.26	0.35	10.47	39.19	2.33	—	—	1.54							99.51	3.152
A3. III	.707	.022	.002	.146	.980	.041											

CLASS V. PERFEMANE.

RANG 1. PERMIRLIC. DUNASE. SECTION 1. PERMIRIC. DUNIASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	40.11	0.88	1.20	6.09	48.58	—	—	—	2.74							100.34	
A2. II	.669	.009	.007	.085	1.215												
2	38.40	0.29	3.42	6.69	45.23	0.35	0.08		4.11	0.24	1.10	none	trace	0.24	none	100.38	
A1. I	.640	.003	.021	.093	1.130	.005	.001					—	—	—	—		
3	42.80	—	—	9.40	47.38	—	trace	—	0.57							100.15	
A4. IV	.713	—	—	.131	1.185	—	—	—									
4	39.99	3.55	—	8.56	41.26	4.19	—	—	2.07					trace		99.62	3.17–3.32
A4. IV	.667	.034	—	.119	1.032	.075	—	—						—			

CLASS V. PERFEMANE.

RANG 1. PERMIRLIC. SECTION 2. DOMIRIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	29.5	3.8	17.8	18.2	8.7	10.0	0.2	0.1	1.0			9.2		0.3		99.2	3.87
B2. III	.492	.037	.111	.253	.218	.178	.003	.001				.115		.004			

CLASS V. PERFEMANE.

RANG 1. PERMIRLIC. SECTION 1. PERMIRIC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	BaO	Sum	Sp. gr.
1	4.08	6.40	33.43	34.58	3.89	0.65	0.29	0.15	1.32			14.25	0.02	0.45		99.71	
A2. II	.068	.063	.209	.480	.097	.011	.005	.002				.176	—	.006			

ORDER 1. PERPOLIC. MAORARE. SECTION 4. DOMOLIC.

SUBRANG 1. PERMAGNESIC.

Inclusive.		Norm.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
Cr_2O_3 NiO	0.76 0.10		di 2.3 hy 19.3 ol 69.2 mt 3.5 cm 1.2	Riddle, Douglas County, Oregon.	F. W. Clarke.	Diller and Clarke, B. U. S. G. S., 60, p. 23, 1890.	Saxonite.	Not fresh.
Spinel	1.90	or 1.7 ab 2.6 an 2.5 ne 4.0	di 11.0 ol 72.2 mt 3.9	Prades, Pyrenees, France.	A. Brunet.	A. Lacroix, cf. N. J., 1895, II, p. 267.	Lherzolite.	Sum high.

SUBRANG 2. DOMAGNESIC.

Cr_2O_3	0.28	an 6.1	di 4.2 hy 15.1 ol 71.2 mt 0.5	Goose Bay, Strait of Magellan.	Not stated.	K. v. Khrustchoff, cf. N. J., 1888, I, p. 83.	Peridotite.	Pebble.

ORDER I. PERPOLIC. MAORARE. SECTION 5. PEROLIC. MAORIARE.

SUBRANG 1. PERMAGNESIC. DUNOSE.

Cr_2O_3 Chromite	0.18 0.56	C 0.9	hy 4.7 ol 89.7 mt 1.6 cm 0.8	Corundum Hill, Macon County, North Carolina.	T. M. Chatard.	T. M. Chatard, B. U. S. G. S., 42, p. 55, 1897.	Dunite.	
ZrO_2 S Cr_2O_3 NiO SrO	none 0.06 0.07 0.10 none	an 0.8	di 0.4 hy 6.2 ol 81.9 mt 4.9	Tulameen River, British Columbia.	W. F. Hillebrand.	J. F. Kemp, Priv. Contrib.	Dunite.	Not fresh.
NiO	trace		hy 11.4 ol 88.2	Dun Mountain, South Island, New Zealand.	A. Schrötter.	F. v. Hochstetter, G. v. Neu Seeland, Wien, 1864, p. 220.	Dunite.	
Cr_2O_3	trace	an 9.5	di 9.0 ol 78.0 mt 1.1	Olivine Range, South Island, New Zealand.	T. Bateman.	G. H. F. Ulrich, Q. J. G. S., XLVI, p. 629, 1890.	Peridotite.	

ORDER 3. POLMITIC. SECTION 1. PERPYRIC.

SUBRANG 3. MAGNESIFERROUS.

FeS_2	0.4	Q 0.5 or 0.6 ab 1.6 an 9.2	di 32.3 hy 10.3 mt 25.8 il 17.7	Druin an Eidhne, Island of Skye, Scotland.	J. H. Player.	Geikie and Teall, Q. J. G. S., L, p. 653, 1894.	Basic schliere in gabbro.	Sum low. One decimal.

ORDER 5. PERMITIC. SUBORDER 2. DOHEMIC.

SUBRANG 4. DOFERROUS.

Cr_2O_3	0.20	or 1.1 ab 2.6 an 3.1 C 4.6	mt 48.5 il 26.8 MgO 3.9 FeO 6.9	Routivaara, Finland.	W. Petersson.	W. Petersson, G. F. F., XV, p. 49, 1893.	Magnetite-spinellite.	

PART II.

INFERIOR ANALYSES, AND ANALYSES OF TUFFS, ASHES, AND DECOMPOSED ROCKS: ARRANGED ACCORDING TO THE SYSTEM OF PETROGRAPHY PRESENTED IN ZIRKEL'S LEHRBUCH.

GRANITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 B3. IV	69.39	17.46	n. d.	1.38	0.52	2.14	5.18	2.77	0.47	0.06					99.37	
2 C4. V	74.64	14.90	1.56	n. d.	trace	0.39	0.41	6.88	0.27						99.05	
3 C3. V	73.02	16.22	n. d.	2.59	trace	0.94	3.60	3.42	(0.21)					trace	100.00	
4 C2. IV	73.48	15.26	n. d.	1.42	0.09	0.88	3.12	5.66	n. d.		none			0.10	100.01	
5 D2. V	71.54	14.24	0.74	1.18	0.34	0.98	3.39	4.73	0.61		trace	0.84			98.59	
6 C3. V	69.56	15.38	2.65	n. d.	trace	1.76	5.38	4.31	1.02						100.06	
7 D2. V	71.44	14.72	2.39	0.46	0.96	trace	7.66	0.89	0.61			0.78	trace	trace	99.91	2.635
8 D2. V	70.42	14.64	1.54	2.34	1.20	trace	7.80	0.71	0.61			0.48	trace	trace	99.74	2.634
9 C3. V	72.47	16.17	n. d.	0.41	0.14	1.65	3.43	4.83	(0.49)					0.39	100.00	
10 C3. V	76.07	12.67	2.00	n. d.	0.10	0.85	3.37	4.71	n. d.					0.03	99.80	
11 D4. V	75.14	15.57	n. d.	2.49	n. d.	1.85	4.41	0.54	n. d.						100.00	
12 B3. IV	69.47	17.50	2.30	n. d.	0.31	2.57	3.01	4.07	0.74	0.08				trace	100.09	
13 D4. V	73.05	14.53	2.96	n. d.	trace	2.06	(1.72)	5.39	0.29					trace	100.00	
14 D4. V	71.64	15.66	2.34	n. d.	trace	2.70	(1.58)	5.60	0.48					trace	100.00	2.654
15 D4. V	72.73	16.95			trace	1.05	0.90	8.15	0.22						100.00	
16 B3. V	68.11	14.28	n. d.	2.63	0.68	1.86	6.57	5.46	n. d.						99.93	
17 C2. IV	63.19	10.50	10.97	1.51	1.44	6.12	1.92	4.02	0.19						99.86	
18 B4. V	69.33	14.33	n. d.	3.60	2.44	3.21	2.70	2.67	1.22				0.10		99.60	
19 B3. IV	66.82	15.62	1.88	1.69	2.76	3.13	2.58	2.04	3.27						99.79	
20 C3. V	67.98	16.14	n. d.	4.39	0.53	5.89	4.32	0.45	0.30						100.00	

GRANITE.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		McLaren Bay, Lake Keepawa, Quebec.	F. G. Wait.	G. C. Hoffmann, A. R. G. S. Can., IX, p. 19R, 1898.	Granitite-gneiss.	
		Blue Hill, Hancock County, Maine.	H. J. Williams.	W. C. Day, 19 A. R. U. S. G. S., II, p. 215, 1898.	Granite.	Alkalies?
S	none	Blue Hill, Hancock County, Maine.	Ricketts and Banks.	W. C. Day, 18 A. R. U. S. G. S., V, p. 962, 1897.	Granite.	Alkalies? H_2O by difference.
S	trace	Waldoboro, Lincoln County, Maine.	Ricketts and Banks.	W. C. Day, 20 A. R. U. S. G. S., VI, p. 391, 1899.	Granite.	
S	trace	North Jay, Maine.	E. T. Rodgers.	W. C. Day, 19 A. R. U. S. G. S., VI (2), p. 219, 1898.	Granite.	
		Barre, Vermont.	W. C. Day?	W. C. Day, 19 A. R. U. S. G. S., VI (2), p. 224, 1898.	Granite.	H_2O includes CO_2.
S	trace	Redstone, Carroll County, New Hampshire.	F. C. Robinson.	W. C. Day, 20 A. R. U. S. G. S., VI, p. 417, 1899.	Red granite.	Alkalies?
S	trace	Redstone, Carroll County, New Hampshire.	F. C. Robinson.	W. C. Day, 20 A. R. U. S. G. S., VI, p. 417, 1899.	Green granite.	Alkalies?
S	0.02	Mason, Hillsboro County, New Hampshire.	Ricketts and Banks.	W. C. Day, 20 A. R. U. S. G. S., VI, p. 418, 1899.	Granite.	H_2O by difference.
		Milford, Massachusetts.	C. F. Chandler.	W. C. Day, 19 A. R. U. S. G. S., VI (2), p. 221, 1898.	Granite.	
		Quincy, Massachusetts.	E. R. Angell.	W. C. Day, 19 A. R. U. S. G. S., VI (2), p. 229, 1898.	Granite.	Cf. No. 11, liparose.
S	0.04	Chester, Hampden County, Massachusetts.	Not stated.	W. C. Day, 18 A. R. U. S. G. S., V, p. 965, 1897.	Granite.	
		Westerly, Rhode Island.	F. W. Love.	J. F. Kemp, B. G. S. A., X, p. 375, 1899.	Granite.	Na_2O by difference.
		Westerly, Rhode Island.	F. W. Love.	J. F. Kemp, B. G. S. A., X, p. 375, 1899.	Granite.	Na_2O by difference.
		Stony Creek, Connecticut.	L. P. Kinnicut.	J. F. Kemp, B. G. S. A., X, p. 375, 1899.	Granite.	
S	0.34	Waterford, Connecticut.	Ricketts and Banks.	W. C. Day, 19 A. R. U. S. G. S., VI (2), p. 214, 1898.	Granite.	
		Stony Point, Rockland County, New York.	J. F. Geiste.	W. C. Day, 20 A. R. U. S. G. S., VI, p. 421, 1899.	Granite.	Iron oxides? Al_2O_3? Alkalies?
		Pierce's Mill, Broad Branch, District of Columbia.	R. L. Packard.	G. H. Williams, 15 A. R. U. S. G. S., p. 672, 1895.	Granite.	
		Pierce's Mill, Broad Branch, District of Columbia.	R. L. Packard.	G. P. Merrill, B. G. S. A., VI, p. 323, 1895.	Granite.	Decomposed.
		Wilmington, Delaware.	Booth, Garrett, and Blair.	W. C. Day, 19 A. R. U. S. G. S., VI (2), p. 214, 1898.	Granite.	

GRANITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
21 C4. V	64.12	20.91	2.96	n. d.	0.66	1.98	4.57	4.82	n. d.						100.02	
22 D3. V	64.85	11.44	2.94	6.02	1.60	3.49	3.92	3.02	0.78				0.24	trace	98.30	2.788
23 B4. V	76.62	13.02	1.01	n. d.	0.05	0.51	2.24	6.38	n. d.						99.83	
24 B4. V	77.05	11.77	2.33	n. d.	n. d.	2.21	2.90	3.88	0.52				0.02		100.68	
25 A1. I	65.14	15.63	2.37	2.13	1.85	3.62	2.63	4.29	0.75	0.37		0.59	0.16	trace	99.68	
26 A1. I	64.81	19.44	1.82	0.16	0.19	0.18	0.21	5.30	5.25	1.41	none	0.73	0.10	trace	100.01	
27 A1. I	71.93	12.21	0.64	2.99	0.58	2.59	0.23	3.29	0.37	2.06	1.95	0.40	0.10	0.18	99.92	
28 A1. I	66.66	14.26	0.67	2.41	0.95	3.37	none	4.19	2.16	0.36	3.67	0.49	0.17	trace	100.31	
29 C4. V	75.35	13.69	3.94	n. d.	0.06	2.97	1.14	2.85	n. d.						100.00	
30 A1. I	84.15	9.67	0.51	0.07	0.04	0.53	2.65	1.57	0.74	0.21		trace		trace	100.14	
31 D3. V	64.91	21.49	1.09	4.62	1.13	0.71	2.72	3.55	n. d.						100.22	
32 B3. IV	75.8	13.7	0.5	0.3	trace	0.5	1.9	6.5	0.03						99.5	2.59
33 C3. V	66.6	17.4	1.1	2.1	1.2	2.2	3.1	4.6	0.9						99.2	2.62
34 B3. IV	62.3	18.6	1.5	3.0	2.5	4.3	1.9	4.8	0.6						99.5	2.67
35 B4. IV	68.55	16.21	2.26	n. d.	1.04	2.40	4.08	4.14	n. d.					0.45	99.13	
36 B4. V	70.6	13.3	3.1	n. d.	0.4	2.2	0.8	9.2	0.3						99.9	
37 B4. V	75.00	13.24	2.52	n. d.	n. d.	0.69	3.07	4.33	0.80						99.65	
38 D4. V	71.78	15.86	4.19	n. d.	0.50	3.16	4.10	1.13	1.17						101.89	
39 B4. V	70.69	15.20	3.76	n. d.	0.45	3.31	4.69	2.31	0.56						101.07	
40 C4 V	71.80	16.00	1.76	n. d.	1.83	1.74	3.47	4.20	0.62						101.42	

GRANITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Petersburg, Virginia.	Hunt and Clapp.	W. C. Day, 19 A. R. U. S. G. S., VI (2), p. 227, 1898.	Granite.	Al_2O_3 high.
	Sudbury, Ontario.	Not stated.	T. L. Walker, Q. J. G. S., LIII, p. 56, 1897.	Granite.	
	Waushara County, Wisconsin.	Not stated.	W. C. Day, 18 A. R. U. S. G. S., V, p. 975, 1897.	Granite.	
	Graniteville, Missouri.	W. H. Melville.	W. C. Day, 18 A. R. U. S. G. S., V, p. 968, 1897.	Granite.	
SO_3 0.05 BaO 0.10 SrO trace	Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 749, 1899.	Granite.	Weathered. Cf. Nos. 5 and 6, harzose.
SO_3 0.31 BaO 0.10 SrO trace	Butte, Montana.	H. N. Stokes.	Weed and Tower, B. U. G. S., 168, p. 117, 1900.	Granite.	Altered. Cf. Nos. 5 and 6, harzose.
S 0.18 NiO none BaO trace Fe 0.13 Zn 0.09 Pb trace	Hailey, Idaho.	W. F. Hillebrand.	W. Lindgren, 20 A. R. U. S. G. S., III, p. 219, 1900.	Quartz-monzonite.	Altered. Cf. No. 31, toscanose
SO_3 none S 0.95 BaO none	Silver Wreath Tunnel, Boise County, Idaho.	G. Steiger.	W. Lindgren, 18 A. R. U. S. G. S., III, p. 640, 1898.	Granite.	Altered. Cf. No. 4, yellowstonose.
	Exeter, Tulare County, California.	Watertown Arsenal.	W. C. Day, 20 A. R. U. S. G. S., VI, p. 358, 1899.	Granite.	
F 0.02 SrO trace	Belmont, Nevada.	H. N. Stokes.	J. E. Spurr, A. J. S., X, p. 358, 1900.	Beresite.	
	Janucillo, Monte Cumbre, Argentina.	J. C. Jenkins.	A. Stelzner, Btr. G. Pal. Arg. Rep., I, p. 211, 1885.	Andengranit.	Al_2O_3 high.
	Ben Damhain, Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Eurite.	
	Alt-na-Lairige, Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Granitite.	
	Alt-na-Lairige, Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Hornblende-granitite.	
	Shap Fell, Westmoreland, England.	J. B. Cohen.	Harker and Marr, Q. J. G. S., XLVII, p. 276, 1891.	Granite.	
	Y Drosge, Caernarvonshire, Wales.	E. H. Acton.	A. Harker, Bala Volcanic Series, 1889, p. 46.	Granophyre.	
	Mourne Mountains, County Down, Ireland.	S. Haughton.	W. J. Sollas, Tr. R. Ir. Acad., XXX, Pt. XI, p. 491, 1894.	Granite	
	Aughrim, Leinster, Ireland.	Not stated.	W. J. Sollas, Tr. R. Ir. Acad., XXIX, Pt. XIV, p. 477, 1891.	Microgranite.	
	Aughrim, Leinster, Ireland.	Not stated.	W. J. Sollas, Tr. R. Ir. Acad., XXIX, Pt. XIV, p. 471, 1891.	Soda-granite.	
	Le Huelgoat, Brittany, France.	Not stated.	C. Barrois, Guide Exc. VIII Cong. G. Int., VII, p. 21, 1900.	Granite.	

GRANITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
41 D3. V	73.79	12.36	0.63	0.52	0.19	trace	5.45	5.71	0.51						99.16	2.573
42 C3. V	66.62	17.35	3.91	0.19	trace	trace	4.52	4.93	1.85				0.99		100.36	
43 C4. V	75.59	12.93	n. d.	n. d.	n. d.	trace	3.44	7.05	0.69						99.70	
44 B4. V	70.67	14.80	n. d.	3.07	trace	1.33	2.51	8.26	n. d.						100.67	
45 B3. IV	56.97	20.96	n. d.	3.28	0.77	6.58	6.63	2.91	1.96			0.68			100.52	
46 C3. V	67.3	15.2	1.2	3.4	1.2	3.6	3.8	3.4	1.7					0.4	101.2	
47 D3. V	71.53	13.70	1.79	2.34	0.48	2.08	6.71	2.82	0.34						101.79	
48 C3. V	69.52	14.04	0.34	4.42	0.32	2.40	3.40	6.25	0.52						101.21	
49 D3. V	66.95	15.03	2.14	3.23	0.33	3.22	4.43	2.46	0.39						98.18	
50 B3. IV	76.86	10.76	1.97	n. d.	0.81	1.42	2.46	4.33	1.04			trace	trace	0.36	100.01	2.655
51 D4. V	76.10	14.36	2.99	trace	1.51	trace	3.77	0.81	0.11					0.48	100.13	2.469
52 D2. V	74.19	12.80	2.11	1.17	0.50	n. d.	2.49	4.48	0.30	0.04		0.06	0.65		98.81 (99.82)	
53 C2. IV	71.58	14.39	1.40	1.27	0.93	2.01	3.31	4.82	1.18				0.31		101.20	2.668
54 C2. IV	68.90	16.80	1.77	1.64	1.34	1.80	3.90	3.11	1.91				0.24		101.41	2.681
55 B4. V	74.29	15.95			0.66	0.78	2.66	5.31	0.66				trace	trace	100.31	2.68
56 B4. V	69.26	14.13	4.38	n. d.	3.31	4.31	1.54	1.96	0.99						99.88	
57 A4. IV	76.62	11.76	n. d.	3.51	0.22	1.80	3.02	2.85	0.70						100.48	
58 A4. IV	76.20	12.89	n. d.	1.72	0.80	0.50	3.19	3.93	1.16						100.39	
59 A4. IV	75.96	13.38	n. d.	1.66	0.34	0.88	3.32	4.58	0.46						100.58	
60 B4. V	75.23	16.13	n. d.	trace	0.13	0.88	3.87	3.77	0.83						100.84	

GRANITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Apietto, Corsica.	G. Rupprecht.	G. Rupprecht, In. Diss. Erlangen, 1889, p. 14.	Granite.	Alkalies high.
	Ajaccio, Corsica.	G. Rupprecht.	G. Rupprecht, In. Diss. Erlangen, 1889, p. 6.	Biotite-granite.	P_2O_5 high.
	Kullen, Sweden.	L. G. Thomé.	A. Hennig, cf. N. J. 1901, II, p. 59.	Pegmatite.	
	Vasastaden, Sweden.	H. Bäckström.	H. Bäckström, G. F. F., IX, p. 357, 1887.	Granite.	
	Slättmosa, Sweden.	H. Bäckström.	H. Bäckström, G. F. F., IX, p. 360, 1887.	Granite.	
	Upsala, Sweden.	A. G. Högbom.	A. G. Högbom, G. F. F., X, p. 222, 1888.	Granite.	
	Wiborg, Finland.	H. Berghell.	H. Berghell, Finl. G. Und. Bl. 33, p. 23, 1898.	Rapakiwi granite.	
	Huovila, Säkkijärvi, Finland.	H. Berghell.	H. Berghell, Finl. G. Und. Bl. 28, p. 15, 1896.	Rapakiwi granite.	
	Simola, Wiborg, Finland.	H. Berghell.	H. Berghell, Finl. G. Und. Bl. 33, p. 25, 1898.	Rapakiwi granite.	
BaO trace	Dilshofen, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kte. Hesse, I, Bl. Rossdorf, p. 36, 1886.	Microgranite.	
	Dachsberg, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kte. Hesse, I. Bl. Rossdorf, p. 35, 1886.	Granitite.	
BaO 0.02	Gottelsberg, Aschaffenburg, Hesse.	Not stated.	G. Klemm, Erl. G. Kte. Hesse, III, Bl. Schafheim, p. 15, 1894.	Granite.	Sum uncertain.
Li_2O trace Cu trace	Reuth, Bavaria.	A. Böttger.	F. v. Sandberger, Sb. Munch. Akad., XVIII, p. 466, 1888.	Lithionite-granite.	
	Strehlenberg, Redwitz, Bavaria.	A. Böttger.	F. V. Sandberger, Sb. Munch. Akad., XVIII, p. 466, 1888.	Lithionite-granite.	
	Rican, Prague, Bohemia.	E. Kubricht.	F. Katzer, Jb. Wien. G. R-A., XXXVIII, p. 411, 1888.	Granite.	
	Reifnig, Bachergebirge, Styria.	A. Pontoni.	A. Pontoni, T. M. P. M., XIV, p. 366, 1895.	Granite.	
	Aig. du Grand Charmoz, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Near Orny, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Arete du Chatelet, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 47, 1898.	Protogine.	
	Les Rognes, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 82, 1898.	Aplite.	

GRANITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
61 A4. IV	75.21	13.88	n. d.	0.91	0.25	1.19	3.96	4.50	0.24						100.14	
62 C4. V	74.66	13.84	n. d.	2.01	0.41	1.05	3.33	5.34	0.64						101.28	
63 A4. IV	74.14	13.30	n. d.	1.61	0.20	0.69	3.63	6.08	0.60						100.25	
64 A4. IV	73.85	15.23	n. d.	1.14	0.29	1.68	3.27	4.10	0.36						99.92	
65 A4. IV	72.42	14.83	n. d.	1.79	0.28	1.15	3.42	5.49	0.53						99.91	
66 C4. V	72.15	16.12	n. d.	2.01	0.32	1.20	3.43	5.71	0.74						101.68	
67 A4. IV	72.08	13.54	n. d.	2.75	0.40	1.15	4.33	4.76	0.51						99.52	
68 A4. IV	71.84	14.07	n. d.	2.01	0.40	1.08	4.11	5.25	0.86						99.62	
69 D4. V	71.64	17.12	trace.	d.	n. d.	1.62	3.87	3.95	n. d.						98.20	
70 A4. IV	70.62	15.50	n. d.	2.84	0.32	2.05	3.05	4.76	1.01						100.15	
71 A4. IV	69.95	14.35	n. d.	3.47	1.20	1.27	3.32	4.92	1.29						99.77	
72 A4. IV	69.85	16.10	n. d.	1.89	0.71	0.72	3.21	6.13	0.90						99.51	
73 A4. IV	69.54	15.20	n. d.	2.76	0.34	2.16	4.19	5.37	0.97						100.53	
74 A4. IV	68.91	15.89	n. d.	3.46	0.60	2.35	4.10	4.01	0.53						99.85	
75 D4. V	68.55	15.95	n. d.	1.85	0.46	1.86	3.70	5.57	0.91						98.85	
76 B4. V	68.53		20.37		0.45	2.47	3.17	5.25	0.39						100.63	
77 D4. V	66.35	17.47	n. d.	3.18	0.46	2.31	5.64	5.43	0.73						101.57	
78 B4. IV	69.30	16.40	n. d.	4.50	1.18	1.12	5.02	3.46	n. d.						100.98	
79 A3. III	70.34	13.64	1.04	n. d.	0.09	0.59	1.23	0.18	12.52			0.24			100.22	2.613 11°
80 A4. IV	70.41	16.17	2.54	n. d.	0.86	2.11	3.45	4.29	0.66						100.49	

GRANITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Aig. du Tacul, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 82, 1898.	Aplite.	
	Treutz-Bouc, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Arete de la Breya, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 47, 1898.	Protogine.	
	Aig. du Charmoz, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 82, 1898.	Aplite.	
	Col du Géant, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Pas d'Arpette, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Le Pissoir, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Clocher de Planereuse, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 47, 1898.	Protogine.	
	Glacier du Trient, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 82, 1898.	Aplite.	
	Aiguille du Dru, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Col du Chardonnet, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Glacier d'Orny, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Glacier d'Orny, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Glacier de Brensa, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Glacier d'Orny, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Le Portalet, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 47, 1898.	Protogine.	
	Rocher Tourette, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 48, 1898.	Protogine.	
	Serra di Longone, Elba, Italy.	A. Funaro.	A. Funaro, B. Com. G. Ital., XVII, p. 381, 1886.	Granite.	
F 0.35	Kyssyr Dagh, Karabagh District, Trans-Caucasia.	A. Röhrig.	C. R. Thost, Abh. Senkenb. Nat. Ges., XVIII, p. 219, 1894.	Granite.	Altered.
	Cap Marsa, Ménerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 18, 1900.	Tourmaline-granite.	

GRANITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
81 C4. V	64.48	18.39	4.67	n.d.	1.61	4.48	2.77	3.39	1.32						101.11	
82 A4. IV	63.54	17.24	5.72	n.d.	1.70	4.31	3.22	2.90	1.30						99.93	
83 B4. V	75.54	13.75	4.99	n.d.	0.69	0.94	1.55	3.34	0.28						101.08	

QUARTZ-PORPHYRY.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 C3. V	74.21	12.77	2.51	2.04	1.04	0.98	2.17	5.44	n. d.					trace	101.16	
2 D4. V	67.20	14.95	5.19	n. d.	2.39	0.30	4.00	0.89	2.13		0.40				97.45	2.43
3 A4. IV	67.9	15.7	3.0	n. d.	1.5	1.4	1.5	5.6	3.7						100.3	
4 B3. IV	73.69	14.26	0.73	0.41	trace.	trace.	3.76	7.84	0.31						101.00	2.626
5 B4. V	76.40	15.68	0.78	n. d.	n. d.	n. d.	4.92	1.10	0.88						99.76	2.603
6 B2. III	75.78	11.22	0.56	2.54	0.53	0.95	2.14	4.08	1.26		1.16	0.31			100.82	
7 B4. V	73.03	14.33	2.64	n. d.	0.41	0.74	2.97	2.07	2.58	——			trace	0.69	99.46	2.654
8 B4. IV	72.08	16.15	2.21	n. d.	0.68	0.18	0.21	5.23	2.40	——					99.14	2.594
9 A2. II	70.88	15.15	3.22	0.55	0.53	0.21	0.23	5.51	2.72			0.32	0.26		99.75	2.685
10 C4. V	75.76	12.24	n. d.	2.06	0.29	2.51	3.13	4.22	n. d.		0.83			0.44	101.48	
11 B3. IV	76.66	10.85	0.96	n. d.	trace.	0.32	0.49	9.58	0.61					trace	99.47	
12 D4. V	68.45	12.40	4.20	n. d.	0.67	1.53	4.36	5.91	1.24						98.76	
13 C3. V	66.83	16.40	3.17	1.89	1.07	2.59	4.65	4.21	0.51						101.32	
14 D4. V	78.25	13.22	n. d.	1.11	0.26	1.29	3.88	4.00	0.48						102.49	
15 B4. V	75.81	13.70	n. d.	2.24	trace.	0.72	3.96	4.13	n. d.						100.56	
16 B4. V	75.81	13.15	n. d.	1.16	0.35	0.89	3.66	5.43	0.40						100.85	

GRANITE—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Sidi Mokren, Ménerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 18, 1900.	Granite.	
		Ain Tolba, Ménerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 18, 1900.	Granite.	
		St. Thomas Mount, Madras, India.	T. L. Walker.	T. H. Holland, Mem. G. S. India, XXVIII, p. 142, 1900.	Charnockite.	

QUARTZ-PORPHYRY.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Blue Hills, Massachusetts.	Students of Mass. Inst. Techn.	W. O. Crosby, Occ. Pap. Bost. Soc. Nh., IV, p. 362, 1900.	Quartz-porphyry.	Mean of many poor determinations.
		Flagstaff Hill, Boulder, Colorado.	Palmer and Fulton.	Palmer and Fulton, Pr. Colo. Sci. Soc., III, p. 356, 1890.	Quartz-porphyry.	
		Coquet, Cheviot Hills, Scotland.	Waller.	J. J. H. Teall, Geol. Mag., XXII, p. 111, 1885.	Quartz-felsite.	
		Ajaccio, Corsica.	G. Rupprecht.	G. Rupprecht, In Diss. Erlangen, 1889, p. 11.	Quartz-porphyry.	
		Goldstein, Westphalia.	A. Bömer.	O. Mügge, N. J. B. B., X, p. 776, 1896.	Quartz-porphyry.	
SO_3	0.12	Röspe, Westphalia.	K. Gremse.	O. Mügge, N. J. B. B., VIII, p. 577, 1893.	Porphyry tuff.	
		Oberhunden, Westphalia.	A. Bömer.	O. Mügge, N. J. B. B., VIII, p. 568, 1893.	Porphyry.	Metamorphosed.
		Bruchhauser Steine, Westphalia.	A. Bömer.	O. Mügge, N. J. B. B., X, p. 776, 1896.	Quartz-porphyry.	Metamorphosed.
SO_3	0.17	Alvensleben, Magdeburg, Hesse.	Hampe.	F. Klockmann, Jb. Pr. G. L-A., XI, p. 196, 1892.	Quartz-porphyry tuff.	
		Libsic, Moldauthal, Bohemia.	Plaminek.	J. Klvana, Cf. N. J., 1898, I, p. 485.	Felsophyre.	
Li_2O	trace	Czeremosz River, Galicia.	J. Schramm.	R. Zuber, T. M. P. M., VII, p. 196, 1886.	Hälleflinta.	
		Zalas, Cracow, Galicia.	R. Zuber.	R. Zuber, Jb. Wien. G. R-A., XXXV, p. 747, 1885.	Quartz-porphyry.	
		Javoria, S. Carinthia.	H. V. Graber.	H. V. Graber, Jb. Wien. G. R-A., XLVII, p. 278, 1897.	Quartz-porphyry.	
		Arete du Chatelet, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 107, 1898.	Quartz-porphyry.	
		Arete de la Breya, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 107, 1898.	Quartz-porphyry.	
		Chalet de Planereuse, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 107, 1898.	Quartz-porphyry.	

QUARTZ-PORPHYRY—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
17 D4. V	73.25	14.39	n. d.	2.21	0.53	2.36	3.02	5.94	1.11						102.81	
18 A4. IV	71.48	14.82	n. d.	2.42	0.27	0.93	4.00	5.69	0.35						99.96	
19 C4. V	71.03	15.24	n. d.	2.58	0.43	1.39	4.29	6.12	0.27						101.35	
20 B4. V	69.81	14.78	n. d.	3.15	0.98	2.94	3.73	4.63	0.78						100.80	
21 C4. V	68.87	16.49	n. d.	2.62	0.32	2.25	4.13	5.89	0.83						101.40	
22 D4. V	67.78	15.88	n. d.	3.97	1.25	2.90	3.95	4.95	1.32						102.00	
23 C3. V	71.10	15.92	3.17	0.34	trace	0.88	3.17	6.11	0.11		0.45				101.25	
24 C4. V	70.10	16.25	n. d.	4.05	0.54	1.32	4.27	4.20	n. d.						100.73	
25 B3. IV	68.5	14.5	1.0	3.0	0.1	trace	9.2	3.0	n. d.						99.3	
26 C4. V	75.51	18.10	2.69	n. d.	0.12	0.36	0.16	1.23	n. d.					0.82	98.99	

RHYOLITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 D4. V	73.09	13.43	2.57	n. d.	1.03	2.29	3.85	1.58	0.76						98.60	
2 A2. II	61.21	15.67	4.06	0.62	1.58	2.18	1.57	2.75	10.20			0.56		0.10	100.50	
3 A4. IV	71.01	15.17		n. d.	0.34	1.19	2.77	2.97	6.34						99.79	
4 A3. III	68.68	12.69	1.14	1.17	1.14	1.11	1.23	5.58	7.99						100.73	
5 A1. I	87.37	7.44	0.09	0.18	0.12	0.10	0.14	1.79	1.39	0.51		0.09	trace	trace	100.24	
6 A1. I	78.59	12.13	none	0.09	0.41	0.16	0.10	2.55	2.47	0.82		0.12	trace	trace	100.07	
7 C2. IV	66.69	15.40	1.84	n. d.	0.85	0.09	0.16	3.50	2.97	0.83		2.11	0.08	trace	98.71	
8 A2. II	89.20	2.39	1.21	none	trace	trace	1.11	0.79	5.09			none	none		100.23	
9 A4. IV	75.07	12.15	1.62	n. d.	0.14	0.86	4.12	4.57	1.34					0.05	99.92	

QUARTZ-PORPHYRY—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Col du Grépillon, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 108, 1898.	Quartz-porphyry.	
	Les Six-niers, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 108, 1898.	Quartz-porphyry.	
	La Maya, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 108, 1898.	Quartz-porphyry.	
	Arete du Chatelet, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 107, 1898.	Quartz-porphyry.	
	La Maya, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 107, 1898.	Quartz-porphyry.	
	L'Amone, Mont Blanc.	Duparc.	Duparc and Mrazec, Mem. Soc. Phys. Gen., XXXIII, No. 1, p. 108, 1898.	Quartz-porphyry.	
	Malga Serra Caprile, Adamello Group, Piedmont.	C. Riva.	C. Riva, cf. N. J., 1897, II, p. 63.	Quartz-porphyry.	
	Mola, Serra de Longone, Elba.	A. Funaro.	A. Funaro, B. Com. G. Ital., XVII, p. 381, 1886.	Quartz-porphyry.	
	Comende, San Pietro, Sardinia.	S. Bertolio.	S. Bertolio, Rend. Acc. Linc., V, p. 151, 1896.	Comendite.	Cf. No. 74, liparose.
	Golabara River, Servia.	A. B. Griffiths.	A. B. Griffiths, Q. J. G. S., XLII, p. 566, 1886.	Porphyry.	

RHYOLITE.

	Utley, Green Lake County, Wisconsin.	S. Weidman.	S. Weidman, B. Wisc. G. Nh. S., III, p. 14, 1898.	Metarhyolite.	Cf. B. U. S. G. S., 150, p. 169, 1898.
	Checkerboard Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. U. S. G. S., 139, p. 128, 1896.	Rhyolite tuff.	
	Bozeman, Montana.	F. W. Clarke.	A. C. Peale, B. U. S. G. S., 148, p. 141, 1897.	Rhyolitic volcanic dust.	
	Gallatin Valley, Gallatin County, Montana.	H. N. Stokes.	J. P. Iddings, B. U. S. G. S., 150, p. 147, 1898.	Rhyolite ash.	
FeS_2 1.00 NiO none BaO 0.02 SrO none	De Lamar Mine, Silver City, Idaho.	W. F. Hillebrand.	W. Lindgren, 20 A. R. U. S. G. S., III, p. 179, 1900.	Altered rhyolite.	
FeS_2 2.61 NiO none BaO 0.02 SrO none	De Lamar Mine, Silver City, Idaho.	W. F. Hillebrand.	W. Lindgren, 20 A. R. U. S. G. S., III, p. 179, 1900.	Altered rhyolite.	
SO_3 0.11 FeS_2 3.99 BaO 0.09	De Lamar Mine, Silver City, Idaho.	H. N. Stokes.	W. Lindgren, 20 A. R. U. S. G. S., III, p. 179, 1900.	Altered rhyolite.	
SO_3 0.44	Iron Pot, Lower Basin, Yellowstone National Park.	J. E. Whitfield.	W. H. Weed, B. U. S. G. S., 148, p. 132, 1897.	Altered rhyolite.	
	Summit County, Colorado.	Teplitz.	A. Lagorio, T. M. P. M., VIII, p. 454, 1887.	Nevadite.	

RHYOLITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
10 A4. IV	71.02	14.27	1.22	n. d.	trace	1.38	2.28	3.97	6.12						100.26	
11 A3. III	70.40	13.50	1.31	1.61	0.37	0.56	2.11	2.39	7.41	1.05			0.08	trace	100.79	
12 A3. III	70.01	12.61	1.47	0.50	0.72	1.06	1.94	5.12	4.68				0.04	trace	100.52	
13 B4. V	69.85	13.34	0.73	n. d.	trace	0.87	5.58	2.68	6.15						99.20	2.32
14 A4. IV	73.91	15.29	n. d.	0.89	n. d.	0.77	3.62	4.79	1.19				0.07		100.53	
15 B4. V	74.59	12.88	0.80	n. d.	0.30	0.76	3.30	5.35	1.03						99.01	2.324
16 B4. V	72.14	15.93	1.99	n. d.	0.40	1.93	3.97	2.55	n. d.					0.43	99.34	
17 D3. V	69.70	14.78	2.98	n. d.	0.59	1.07	4.77	4.45	n. d.			0.38			98.72	
18 B3. V	62.72	15.69	5.25	n. d.	1.34	3.33	5.45	4.19	n. d.			1.06			99.03	
19 B3. V	72.6	12.4	0.7	1.1	trace	0.9	1.7	4.7	5.2						99.3	2.340
20 B4. V	67.9	15.7	3.0	n. d.	1.5	1.4	1.5	5.6	3.7						100.3	
21 C4. V	77.5	9.7	6.1	n. d.	n. d.	n. d.	0.3	5.8	0.4						99.8	
22 C3. V	74.09	14.98	1.80	1.50	trace	6.07	1.27	1.31							101.02	
23 B4. V	72.30	12.09	2.16	n. d.	2.02	trace	3.41	4.80	1.69						99.37	
24 A4. IV	72.79	13.77	3.32	n. d.	0.62	1.94	4.12	2.99	1.08					trace	100.63	
25 A4. IV	72.06	14.87	1.33	n. d.	1.26	trace	4.11	5.90	0.26						99.79	
26 A4. IV	72.33	13.78	4.02	n. d.	1.59	trace	1.64	5.05	1.34						99.75	2.65
27 B4. V	76.4	14.2	1.6	n. d.	n. d.	0.6	1.8	4.2	1.5						100.3	
28 B4. V	75.31	13.62	2.31	n. d.	0.20	0.97	3.02	4.07	1.48						100.98	2.525
29 C3. V	72.37	11.64	1.42	1.08	0.52	1.30	4.15	3.98	4.86						101.32	2.365

RHYOLITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Blue Mountain, Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, 17 A. R. U. S. G. S., II, p. 322, 1896.	Rhyolite tuff.	
	Hyampom, Trinity County, California.	G. Steiger.	J. S. Diller, B. U. S. G. S., 148, p. 228, 1897.	Rhyolite tuff.	
	Willard's Creek, Lassen County, California.	G. Steiger.	J. S. Diller, B. U. S. G. S., 148, p. 192, 1897.	Rhyolite tuff.	
	Berkeley, California.	C. Palache.	C. Palache, B. Dep. G. Un. Cal., I, p. 67, 1894.	Soda-rhyolite.	
	Pinto Peak, Nevada.	E. Hart.	J. P. Iddings, B. U. S. G. S., 150, p. 162, 1898.	Liparite.	
	Tablon de Itulgache, Ecuador.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 444, 1887.	Obsidian.	
	Kaldadalur, Iceland.	R. Bréon.	R. Bréon, Geol. d'Islande, 1884, p. 29.	Obsidian.	
	Hrafntinnuhraun, Hecla, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 641, 1891.	Liparite.	
	Namshraun, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 645, 1891.	Liparite.	
	Arran, Scotland.	J. H. Player.	J. J. H. Teall, Brit. Petrog., 1888, p. 347.	Pitchstone.	
	The Coquet, Cheviot Hills, Scotland.	T. Waller.	C. T. Clough, Geol. Chev. Hills, Mem. G. S. Gt. Br., 1888, p. 25.	Quartz-felsite.	
	Cwm-Silyn, Caernarvon, Wales.	Acton and Hewitt.	A. Harker, Bala Volcanic Series, 1889, p. 13.	Rhyolite.	
	Pen-y-foel, St. Davids, Wales.	C. Gibbins.	C. L. Morgan, Q. J. G. S., XLVI, p. 262, 1890.	Felsitic tuff.	
FeS_2 0.90	Pen-y-foel, St. Davids, Wales.	C. Gibbins.	C. L. Morgan, Q. J. G. S., XLVI, p. 262, 1890.	Felsite.	
	Cader Idris, Wales.	T. H. Holland.	Cole and Jennings, Q. J. G. S., XLV, p. 435, 1889.	Eurite.	
	Carn Gelli, Pembrokeshire, Wales.	F. E. Tadman.	F. R. C. Reed, Q. J. G. S., LI, p. 177, 1895.	Felsite.	
	Carn Pica, Pembrokeshire, Wales.	F. E. Tadman.	F. R. C. Reed, Q. J. G. S., LI, p. 178, 1895.	Felsite.	
	Tardree, County Antrim, Ireland.	J. H. Player.	J. J. H. Teall, Brit. Petr. 1888, p. 348.	Liparite.	
S trace	Cir Mhor Dike, Arran, Scotland.	Under Thorpe.	J. W. Judd, Q. J. G. S., XLIX, p. 545, 1893.	Quartz-felsite.	
	Cir Mhor Dike, Arran, Scotland.	Under Thorpe.	J. W. Judd, Q. J. G. S., XLIX, p. 545 1893.	Pitchstone-porphyry.	

RHYOLITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O–	H_2O—	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
30 A4. IV	72.50	11.53	2.06	n. d.	2.72	1.79	3.37	5.24	0.70						99.91	
31 A3. III	77.26	13.05	1.64	n. d.	0.24	0.72	5.41	0.65	0.55			0.15			99.67	2.637
32 B4. V	71.44	12.90		n. d.	n. d.	0.82	4.24	2.19	8.42						100.01	
33 B4. V	75.82	13.67		n. d.	0.05	0.58	1.69	6.59	1.07						99.47	2.451
34 C4. V	72.98	14.13		n. d.	0.17	1.73	3.44	3.45	3.85						99.45	2.408
25 B4. V	71.39	15.57		n. d.	0.51	1.29	2.28	5.43	3.95						100.42	2.394
26 A4. IV	72.30	15.52	2.98	n. d.	trace	1.25	2.95	4.73	none						99.73	
27 C4. V	71.50	20.31	0.79	n. d.	n. d.	1.51	1.92	3.58	0.70						100.31	
28 B4. V	71.41	15.07	3.68	n. d.	trace	1.72	1.18	2.95	4.05						100.06	
29 B4. V	74.30	16.56		n. d.	0.16	1.35	2.62	4.32	0.23						99.54	
30 B4. V	72.35	13.97	1.29	n. d.	0.46	0.72	3.58	5.38	1.37						99.12	2.133
31 C4. V	79.1	8.9	1.9	n. d.	0.7	trace	3.9	3.1	0.8					1.1	99.5	
32 B4. V	79.1	8.2	1.3	n. d.	0.9	1.1	3.4	2.2	(3.8)						100.0	
33 B4. V	76.84	5.87	3.92	0.87	0.52	3.34	5.41		1.69					0.73	99.19	
34 D4. V	70.03	18.63	0.11	n. d.	0.10	2.62	3.15		4.28						99.12	
35 B4. V	69.2	8.3	5.4	n. d.	trace	0.1	6.9	2.9	7.0						99.8	
36 C4. V	77.99	12.50	1.20	n. d.	0.09	1.21	2.99	4.95	0.48						101.41	
37 B4. V	77.50	12.83	1.66	n. d.	0.24	1.50	3.44	3.45	0.43						101.05	
38 B4. V	76.68	13.63	1.44	n. d.	0.23	0.99	2.85	4.91	0.36						101.09	
39 B4. V	75.49	15.27		n. d.	0.18	1.26	2.61	4.12	0.82						99.75	
40 B4. V	73.58	13.73		n. d.	0.17	1.85	2.41	3.32	5.62						100.68	

RHYOLITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Tormore, Arran, Scotland.	M. M. Tait.	J. W. Judd, Q. J. G. S., XLIX, p. 558, 1893.	Felsite.	
	Altenshausen, n. Magdeburg, Prussia.	Bodlander.	F. Klockmann, Jb. Pr. G. L-A., XI, p. 200, 1892.	Silicified tuff.	
	Meissen, Saxony.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 490, 1887.	Pitchstone.	
	Schemnitz, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 448, 1887.	Liparite.	
	Hliniker Thal, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 454, 1887.	Liparite-pitchstone.	
	Hlinik, Hungary.	A. Lagorio.	A. Lagorio, T. M., P. M., VIII, p. 444, 1887.	Liparite-perlite.	
	Conti, Ponza Island, Italy.	Aichino.	V. Sabatini, B. Com. G. Ital., XXIV, p. 246, 1903.	Rhyolite.	
	Montagniello, Ponza Island, Æolian Islands.	Aichino.	V. Sabatini, B. Com. G. Ital., XXIV, p. 246, 1893.	Rhyolite.	Al_2O_3 high.
	Cala d' Inferno, Ponza Island, Italy.	Aichino.	V. Sabatini, B. Com. G. Ital., XXIV, p. 245, 1893.	Rhyolite-tuff.	
	Lipari Island, Æolian Islands.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 491, 1887.	Obsidian.	
	Mte. Campo Bianco, Lipari Island, Italy.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 440, 1887.	Obsidian.	
	Comende, San Pietro, Sardinia.	S. Bertolio.	S. Bertolio, B. Com. G. Ital., XXV, p. 417, 1894.	Perlite.	
	Carloforte, San Pietro, Sardinia.	S. Bertolio.	S. Bertolio, B. Com. G. Ital., XXV, p. 411, 1894.	Rhyolite.	H_2O by difference.
	Spalmatore, San Pietro, Sardinia.	H. Fürth.	F. Eigel, T. M. P. M., VIII, p. 67, 1887.	Rhyolite.	Alkalies not separated.
	San Pietro, Sardinia.	Boetsch.	F. Eigel, T. M. P. M., VIII, p. 70, 1887.	Obsidian.	Alkalies not separated.
	Pescetti, San Pietro, Sardinia.	S. Bertolio.	S. Bertolio, B. Com. G. Ital. XXVII, p. 186, 1896.	Perlite.	
	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 77, 1900.	Liparite.	
	Sidi Zerzor, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXIII, No. 2, p. 115, 1900.	Liparite.	
	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 77, 1900.	Liparite.	
	Bon Konfor, Menerville, Algeria.	Duparc and Pearce.	Duparc. Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 26, 1900.	Liparite.	
	Sidi Zerzor, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 115, 1900.	Liparite.	

RHYOLITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
41 A4, IV	70.56	12.80	1.96	n. d.	0.50	1.70	2.18	4.28	6.30			0.28		0.06	100.62	
42 B4. V	74.87	14.23	1.75	n. d.	1.16	1.99	3.03	2.35	1.60						100.98	
43 B3. IV	75.36	14.21	0.13	n. d.	trace	0.84	4.78	2.72	1.09						99.13	
44 B4. V	75.51	14.30	1.01	n. d.	0.24	1.81	1.21	2.89	2.84						99.81	
45 B3. IV	68.15	16.49	3.26	none	none	4.01	3.88	1.59	1.82					0.26	99.46	2.107 18°

SYENITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A4. IV	63.02	14.87	6.53	n. d.	0.95	1.12	5.85	5.62	1.45					0.46	99.87	
2 C4. V	62.96	13.45	3.54	n. d.	0.61	1.28	5.46	5.19	2.77					5.29	100.55	
3 D4. V	59.48	13.46	6.71	n. d.	1.64	1.83	11.67	6.03	0.20			0.17			101.19	
4 B4. V	54.15	18.92	6.79	n. d.	1.90	3.72	5.47	8.44	n. d.						99.81	
5 D4. V	53.80	19.20	n. d.	7.60	4.80	5.70	2.16	5.08	1.28			0.77	1.20		101.59	
6 B4. V	62.52	14.13	7.38	n. d.	1.50	3.36	6.25	3.05	1.20						99.39	
7 D4. V	59.92	16.07	8.76	n. d.	2.07	4.56	3.02	2.82	0.67						97.89	
8 A4. IV	56.79	16.64	9.58	n. d.	2.63	5.12	5.30	2.55	1.27						99.88	
9 D?3. V?	55.00	20.81	3.29	3.83	2.33	5.44	5.87	0.16	0.55						97.28 (100.28)	
10 A4. IV	58.80	16.84	2.04	n. d.	2.75	0.70	5.41	4.14	2.79						100.35	
11 A3. III	47.05	18.52	5.91	3.11	4.24	4.71	3.58	1.83	2.70						100.23	
12 A3. III	43.33	17.88	6.80	4.46	4.99	2.18	3.53	1.02	3.36						100.69	
13 A4. IV	61.97	15.11	6.95	n. d.	4.05	2.87	4.01	2.43	2.98		0.08				100.41	
14 C4. V	61.40	16.66	7.46	n. d.	3.65	2.08	4.75	2.93	0.76		1.54				101.43	

RHYOLITE—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Urgüb, Asia Minor.	Schwager.	L. v. Ammon, cf. N. J. 1900, II, p. 61.	Liparite tuff.	
		Derike, n. Teheran, Persia.	E. Drasche.	C. v. John, Jb. Wien, G. R-A., XXXIV, p. 115, 1884.	Porphyry.	
		Marekanka River, Kamtchatka.	P. Wenjukoff.	P. Wenjukoff, cf. N. J., 1891, I, p. 281.	Liparite glass.	
		Tweed River, New South Wales.	W. F. Smeeth.	W. F. Smeeth, J. R. Soc. N. S. W., XXVIII, p. 311, 1894.	Pitchstone.	
		Bondi, n. Sydney, New South Wales.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XX, p. 236, 1887.	Pumice.	Floated block.

SYENITE.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Beekmantown, Clinton County, New York.	E. W. Morley.	H. P. Cushing, B. G. S. A., IX, p. 248, 1898.	Syenite-porphyry.	
		Fourche Mountain, Little Rock, Arkansas.	R. N. Brackett.	J. F. Williams, A. R. Ark. G. S., 1890, II, p. 99, 1891.	Quartz-syenite.	Al_2O_3 low. MnO high.
		Sawtooth Mountains, Transpecos, Texas.	A. Osann?	A. Osann, T. M. P. M., XV, p. 428, 4895.	Syenite.	Alkalies high. Al_2O_3 low.
Cl	0.42	South Boulder Creek, Montana.	G. P. Merrill.	G. P. Merrill, Proc. U. S. Nat. Mus. XVII, p. 672, 1895.	Syenite.	
		Rochail, Lac Lauvitel, France.	P. Termier?	P. Termier, C. R., CXXIV, p. 319, 1897.	Mica-syenite.	
		Vettakollen, Kristiania, Norway.	Kjerulf.	Cf. W. C. Brögger, Z. K., XVI, p. 50, 1890.	Akerite.	
		Barne Kjern See, Vettakollen, Norway.	Kjerulf.	Cf. W. C. Brögger, Z. K., XVI, p. 50, 1890.	Akerite.	
		Vettakollen, Kristiania, Norway.	Kjerulf.	Cf. W. C. Brögger, Z. K., XVI, p. 50, 1890.	Akerite.	
		Ullernas, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 49, 1890.	Akerite.	$K_2O=3.16$?
FeS_2 $CaCO_3$	3.13 3.75	Vakkerö, Kristiania Fjord, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 64, 1890.	Mica-syenite-porphyry.	Center of dike. Not fresh.
FeS_2 $CaCO_3$	1.95 6.63	Vakkerö, Kristiania Fjord, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 64, 1890.	Mica-syenite-porphyry.	1 foot from border of dike. Not fresh.
FeS_2 $CaCO_3$	3.00 10.34	Vakkerö, Kristiania Fjord, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 64, 1890.	Mica-syenite-porphyry.	Border of dike. Not fresh.
		Rothschönberg, Deutschenbroda, Saxony.	J. M. C. Henderson.	J. M. C. Henderson, Z. D. G. G., XLVII, p. 539, 1895.	Mica-syenite.	
S.	0.20	Rothschönberg, Deutschenbroda, Saxony.	Fritsch and Venator.	J. M. C. Henderson, Z. D. G. G., XLVII, p. 539, 1895.	Mica-syenite.	Not fresh.

SYENITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
15 B4. V	57.63	18.47	5.37	[illegible]	1.14	5.25	5.15	[illegible]	0.45		2.14				100.97	
16 C3. V	62.52	23.54	[illegible]	[illegible]	[illegible]	1.65	4.16	4.02	0.03						99.71	
17 B4. V	48.94	15.80	n.d.	14.25	[illegible]	8.78	5.20	3.42	1.13						100.56	
18 C4. V	54.43	20.57	4.52	n.d.	[illegible]	5.89	[illegible]	[illegible]	0.89						99.85	

MONZONITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A1. I	71.14	16.24	0.94	0.18	1.12	0.25	0.07	4.98	2.74	0.40	none	0.75	0.32	trace	99.51	
2 B4. V	57.11	17.00	12.48	n.d.	1.78	3.99	3.98	2.59	n.d.			1.59			100.50	
3 C3. V	49.25	18.97	15.21	n.d.	3.66	7.17	4.91	2.01	0.30		trace	1.41	0.78		100.99	

PORPHYRY.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 B4. V	63.85	17.51	1.94	0.55	n.d.	5.67	0.25	4.77	1.02		[1] 3.70				99.88	
2 B4. V	68.40	14.07	7.15	n.d.	3.21	1.10	5.09	1.70	—						100.72	
3 B4. V	63.4	17.9	8.4	n.d.	1.4	1.02	3.96	4.2	0.72					trace	101.00	
4 C4. V	62.3	15.7	6.7	n.d.	3.1	2.1	3.77	4.21	1.30						99.18	
5 B4. V	62.3	14.1	8.2	n.d.	3.4	1.3	4.4	3.5	2.2					trace	99.40	
6 B4. V	62.06	13.7	8.9	n.d.	1.4	1.05	5.19	6.0	1.41					trace	99.71	
7 B4. V	61.07	11.8	13.1	n.d.	1.9	1.99	2.8	5.5	1.6					trace	99.76	
8 C4. V	59.5	11.8	13.1	n.d.	2.7	2.2	3.98	4.32	1.55					trace	99.13	
9 B4. V.	54.0	18.9	7.8	n.d.	0.7	3.8	6.5	3.9	2.3			2.0		0.4	100.3	
10 B4. V	67.40	15.02	3.15	n.d.	0.58	1.87	2.81	7.10	0.80						98.71	

SYENITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
S. 0.95	Triebischbach, Rothschönberg, Saxony.	Fritsch and Venator.	J. M. C. Henderson, Z. D. G. G., XLVII, p. 543, 1895.	Mica-syenite.	Not fresh.
	Ditro, Siebenburgen, Hungary.	J. Szadeczky.	J. Szadeczky, cf. N. J., 1901, I, p. 402.	Nordmarkite.	Al_2O_3 high.
ZrO_2 1.30	Ditro, Siebenburgen, Hungary.	Not stated.	V. C. Butureanu, Bul. Soc. Sci. Bukarest, 1897, p. 278.	Syenite.	
	Vitosa Mountain, Sofia, Bulgaria.	L. Dimitrow.	L. Dimitrow, Ds. Wien Akad, LX, p. 493, 1893.	Pyroxene-syenite.	Al_2O_3 high.

MONZONITE.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.26 V_2O_3 0.02 BaO 0.05 SrO trace	Tintic Iron Mine, Tintic district, Utah.	H. N. Stokes.	Tower and Smith, 19 A. R. U. S. G. S., III, p. 661, 1899.	Altered monzonite.	Cf. Nos. 7 and 8 harzose.
	Farsund, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 124.	Quartz-monzonite.	
	Dignaes, Gran, Norway,	Damm and L. Schmelck.	W. C. Brögger, Q. J. G. S., L., p. 19, 1894.	Olivine-gabbro-diabase.	MgO, H_2O, and sum approximate. Olivine-monzonite in Eg. Kg., II, p. 49, 1895.

PORPHYRY.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
S 0.29 CuO 0.33	Tamaya, Chile.	C. Schwartz.	V. Groddeck, Z. D. G. G., XXXIX, p. 250, 1887.	Porphyry?	Not fresh.
	Begon, Entrammes, France.	L. Bertrand.	A. Michel-Lévy, C. R., CXXII, p. 265, 1896.	Albitophyre.	
	Chateau Noir, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Serv. Cte. G. Fr., VI, No. 40, p. 48, 1894.	Orthophyre.	
	Lac du Cerisier, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Serv. Cte. G. Fr., VI, No. 40, p. 49, 1894.	Orthophyre.	
	Glacier St. Sorlin, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Serv. Cte. G. Fr., VI, No. 40, p. 48, 1894.	Orthophyre.	
	Chateau Noir, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Serv. Cte. G. Fr., VI, No. 40, p. 49, 1894.	Orthophyre.	
	Freney, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Serv. Cte. G. Fr., VI, No. 40, p. 49, 1894.	Orthophyre.	
	Chateau Noir, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Serv. Cte. G. Fr., VI, No. 40, p. 49, 1894.	Orthophyre.	
	Brumun, Hedemark, Norway.	H. Bäckström.	H. Bäckström, Bih. Sv. Vet. Ak. Hdl., XVI, Pt. II, No. 3, p. 11, 1888.	Rhomben-porphyry.	
	Varvnejärvi, Teisko, Finland.	H. Berghell.	J. J. Sederholm, B. Com. G. Finl., No. 6, p. 68, 1897.	Orthoclase-porphyry.	

PORPHYRY—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
11 A3. III.	65.77	23.51	1.95	n. d.	0.63	trace.	1.44	3.72	3.35	—					100.37	
12 A3. III.	50.38	36.08	1.36	n. d.	0.66	0.15	1.32	5.17	4.40	—					99.52	2.718
13 C2. IV.	66.42	16.76	1.22	0.62	0.37	0.32	1.26	12.55	1.05		0.03	0.05	trace		101.36	2.56
14 A4. IV	58.74	14.96	n. d.	8.75	1.59	3.68	3.22	3.60	2.87				2.62		100.03	
15 B4. V	56.98	19.01	n. d.	9.75	0.99	3.60	3.58	3.91	1.31				1.71	trace	100.84	
16 C2. V	50.78	18.70	7.28	1.23	5.33	1.57	1.83	7.36	4.20		0.23	1.32	0.22		100.11	
17 C2. V	49.68	19.11	8.45	0.50	3.73	0.33	0.79	8.45	7.30		0.05	1.42	0.21		100.19	
18 A2. II	46.96	15.97	1.92	7.35	8.97	2.72	1.65	5.55	5.58		2.14	1.35	0.26		100.69	2.664
19 A2. II	44.17	13.49	1.69	7.75	4.88	8.23	1.36	5.92	3.43		6.03	2.66	0.65		100.69	2.743
20 A4. IV	59.82	17.89	4.43	n. d.	1.74	3.81	4.27	6.21	2.01					trace	100.18	

KERATOPHYRE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 C4. V	53.40	20.82	3.92	n. d.	1.53	7.05	3.79	2.97		6.57					100.05	
2 A4. IV	67.16	14.53	4.17	n. d.	0.41	1.26	5.55	6.10	1.10						100.28	
3 C4. V	73.00	15.61	n. d.	1.95	n. d.	0.79	4.95	0.88	1.06						99.00	2.63
4 A3. III	63.21	19.92	1.74	3.29	1.63	0.78	5.06	1.42	2.28		0.63	trace	trace		99.96	
5 B3. V	56.50	18.14	3.12	2.86	1.22	3.38	5.28	1.60	1.26		5.11	0.85			99.32	
6 C3. V	79.36	11.54	0.63	n. d.	n. d.	0.50	6.20	0.51	0.95	—				1.35	101.04	2.620
7 B4. V	76.05	14.75	1.55	n. d.	0.95	0.07	0.39	3.26	2.65	—		trace			99.67	2.702

PORPHYRY—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Bilsburg, Eder River, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 568, 1893.	Porphyry.	Metamorphosed. Dried at 105°.
S trace	Oberhunden, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 573, 1893.	Porphyry tuff.	Altered. Dried at 105°.
SO_3 0.71	Rüdesheim, Rhine, Rh. Prussia.	K. Hampe.	K. A. Lossen, Jb. Pr. G. L.-A., V, p. 534, 1885.	Porphyry.	Metamorphosed.
	Weinberg, Upper Lausitz, Prussia.	V. Steger.	V. Steger, cf. N. J., 1887, I, p. 42.	Porphyry.	
	Weinberg, Upper Lausitz, Prussia.	V. Steger.	V. Steger, cf. N. J., 1887, I, p. 42.	Porphyry.	
SO_3 0.06	Geschberg, Bl. Wahlen, Prussia.	Boettcher.	H. Grebe, Erl. G. Kte. Pr., Bl. Wahlen, p. 33, 1889.	Augite-orthophyr.	Al_2O_3 high. Iron oxides? Not fresh.
SO_3 0.17	Audeborn, Bl. Wahlen, Prussia.	Boettcher.	H. Grebe, Erl. G. Kte. Pr., Bl. Wahlen, p. 33, 1889.	Augite-orthophyr.	Al_2O_3 high. Iron oxides? Not fresh.
SO_3 0.27	Pfeffelbach, St. Wendel, Harz Mountains.	Hesse.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 316, 1892.	Augite-syenite-porphyry.	Not fresh.
SO_3 0.39	Neuwerk, Harz Mountains.	Steffen.	K. A. Lossen, Jb. Pr. G. L.-A., VI, p. 213, 1886.	Augite-orthophyr-mandelstein.	Not fresh.
	Zalas, n. Cracow, Galicia.	R. Zuber.	R. Zuber, Jb. Wien. G. R.-A., XXV, p. 745, 1885.	Porphyry.	

KERATOPHYRE.

	Shelburne Point, Burlington, Vermont.	Morrison.	Kemp and Marsters, B. U. S. G. S., 107, p. 20, 1893.	Bostonite.	
	Indian Point, Upper Chateaugay Lake, New York.	A. S. Eakle.	A. S. Eakle, A. G., XII, p. 34, 1893.	Bostonite.	
SO_3 0.76	Baraboo, Wisconsin.	C. F. Austin.	S. Weidmann, B. Un. Wisc., Sci. Ser., I, p. 47, 1895.	Quartz-keratophyre.	
	Mehaigne, Belgium.	A. F. Renard.	Vallée-Poussin and Renard, cf. N. J., 1899, II, p. 65.	Keratophyre tuff.	
	Lake Maena, Gran, Norway.	V. Schmelck.	W. C. Brögger, Q. J. E. S., L, p. 26, 1894.	Bostonite.	Not fresh. Maenaite in Eg. Kg. III, p. 207, 1899.
	Kupferberg, Wipperfürth, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 606, 1893.	Keratophyre.	
S trace	Schameder, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 667, 1893.	Keratophyre tuff.	

KERATOPHYRE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
8 B4. V	75.60	13.46	3.14	n. d.	0.61	0.25	0.79	2.71	2.75	—					99.31	**2.638**
9 A2. II	73.62	11.87	0.66	1.21	0.87	3.11	0.37	3.25	2.62		2.42	0.06	0.07		100.33	**2.695**
10 A4. IV	72.83	14.92	2.28	n. d.	0.32	2.07	2.87	1.46	2.00	—	1.23				100.27	**2.676**
11 B4. V	72.38	13.63	2.83	n. d.	trace	1.10	3.64	1.37	1.87	—	1.23			1.69	99.74	**2.651**
12 A4. IV	71.00	17.49	2.55	n. d.	0.87	0.25	1.45	3.30	2.96	—	0.15	trace			100.02	**2.684**
13 A4. IV	70.10	18.93	2.62	n. d.	0.41	0.38	2.75	1.93	2.70	—		trace	0.35		100.17	**2.662**
14 D4. V	65.53	22.75	1.79	n. d.	0.18	0.26	0.74	3.16	3.51	—					97.92	**2.711**
15 A4. IV	64.04	20.98	3.15	n. d.	1.17	0.39	0.43	5.22	3.94	—		trace	0.38		99.70	2.670
16 C4. V	63.05	25.14	1.23	n. d.	0.36	0.68	5.79	1.81	2.30	—					100.36	2.638
17 C4. V	54.38	32.70	1.86	n. d.	0.20	0.35	1.30	5.40	4.22						100.41	2.742
18 C3. V	49.38	22.31	3.60	10.96	3.35	trace	4.16	0.59	4.50					0.83	99.82	2.740
19 C3. V	70.92	14.62	3.74	0.61	0.43	1.75	5.00	2.38	1.60				0.38	0.25	101.68	
20 B4. V	76.23	15.11		n. d.	0.12	0.60	5.38	1.90	1.17						100.41	
21 C4. V	74.92	13.21	0.87	n. d.	0.71	0.40	4.92	0.66	3.57						99.26	
22 D4. V	74.27	13.59	2.03	n. d.	1.32	0.73	4.66	0.81	1.42						98.83	
23 C4. V	71.39	10.20	6.52	n. d.	0.91	0.61	5.28	2.21	1.94						99.07	
24 C4. V	70.50	15.90	1.03	n. d.	1.42	1.57	4.90	2.70	1.21						99.23	

KERATOPHYRE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Steimel, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 657, 1893.	Keratophyre tuff.	
SO_3 0.20	Steimel, Westphalia.	Gremse.	O. Mügge, N. J. B. B., VIII, p. 651, 1893.	Keratophyre tuff.	Not fresh.
	Hofolke, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 691, 1893.	Keratophyre tuff.	
S trace	Wiebelsaal, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 616, 1893.	Kugel-porphyr.	MnO high.
	Kromel, n. Schameder, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 668, 1893.	Keratophyre tuff.	
	Steimel, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 651, 1893.	Keratophyre tuff.	
	Züschen, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 676, 1893.	Keratophyre tuff.	
	Steimel, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 651, 1893.	Keratophyre tuff.	
	Kupferberg, Wipperfürth, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 606, 1893.	Keratophyre.	Al_2O_3 high.
	Siesel, n. Pasel, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 622, 1893.	Quartz-keratophyre.	Altered. Al_2O_3 high.
S 0.14	Kupferberg, Wipperfürth, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 606, 1893.	Spherulitic keratophyr.	Altered? No CaO? Al_2O_3 high?
	Near Premyslan, Moldau Thal, Bohemia.	Kolar.	J. Klavana, cf. N. J., 1898, I, p. 485.	Felsophyrite.	
	Aï-Danil, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII Cong. G. Int., XXXIII, p. 27, 1897.	Keratophyre.	
	Monastery St. George, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII Cong. G. Int., XXXIII, p. 27, 1897.	Keratophyre.	
	Monastery of St. George, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII Cong. G. Int., XXXIII, p. 27, 1897.	Keratophyre.	
	Seragoz, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII Cong. G. Int., XXXIII, p. 27, 1897.	Taurite.	
	Cape Parthenit, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII Cong. G. Int., XXXIII, p. 27, 1897.	Keratophyre.	

MINETTE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum.	Sp. gr.
1 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]		trace	[illegible]	[illegible]
2 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]			[illegible]	[illegible]	
3 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]			[illegible]	
4 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]						[illegible]	

TRACHYTE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum.	Sp. gr.
1 [illegible]	[illegible]		[illegible]		trace	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	
2 [illegible]	[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					100.74	
3 [illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11.47						[illegible]	
4 [illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]						[illegible]	
5 [illegible]	[illegible]		[illegible]		trace	[illegible]	[illegible]	4.00	[illegible]	1.60					[illegible]	
6 A7 II	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.22	7.05			[illegible]	0.75	trace	100.59	
7 A6 III	[illegible]	[illegible]	[illegible]	n.d.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			0.22	0.73	1.02	100.63	
8 B6 V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.46	3.04	2.46						103.46	
9 B4 V	64.49	[illegible]	[illegible]	n.d.	3.10	2.45	2.19	[illegible]	0.55				trace	trace	99.71	
10 B4 V	[illegible]	21.32	7.29	n.d.	2.06	5.07	6.17	3.65	n.d.						101.92	
11 A4 IV	58.32	[illegible]	4.15	n.d.	1.10	2.19	4.11	3.91	5.87						100.53	
12 B4 V	[illegible]	23.23	1.46	n.d.	trace	2.40	6.93	6.63	1.72						100.52	
13 C3 IV	[illegible]	[illegible]	1.95	0.62	0.15	1.19	6.55	4.11	2.08			0.53		0.08	101.41	
14 C3 IV	61.01	18.46	[illegible]	0.80	0.04	1.91	7.33	4.75	3.00			0.45		trace	101.25	2.562 20°

MINETTE.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
X 0.97 S 1.37	Hull's Cove, Conanicut Island, Rhode Island.	L. V. Pirsson.	L. V. Pirsson, A. J. S., XLVI, p. 375, 1893.	Minette.	Not fresh.
	Franklin Furnace, Sussex County, New Jersey.	L. G. Eakins.	J. P. Iddings, B. U. S. G. S., 150, p. 238, 1898.	Minette.	Probablyinetindase, if TiO_2 and P_2O_5 were determined.
	Weissenburg, Weiler, Elsass.	G. Linck.	G. Linck, Abh. G. Kte. E.-L. III, Pt. I, p. 55, 1884.	Minette.	
	Kapelle, Weiler, Elsass.	G. Linck.	G. Linck, Abh. G. Kte. E.-L. III, Pt. I, p. 57, 1884.	Minette.	

TRACHYTE.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Devil's Pathway, Montana.	J. E. Whitfield.	G. P. Merrill, A. J. S., XXXII, p. 202, 1886.	Trachyte-obsidian dust.	
	Little Sage Creek, Montana.	J. E. Whitfield.	G. P. Merrill, A. J. S., XXXII, p. 202, 1896.	Trachyte-obsidian dust.	
	Bozeman, Montana.	F. W. Clarke.	A. C. Peale, B. U S. G. S., 148, p. 141, 1897.	Volcanic dust.	
	Fort Ellis, Montana.	F. W. Clarke.	A. C. Peale, B. U. S. G. S., 148, p. 141, 1897.	Volcanic dust.	
	Marsh Creek Valley, Idaho.	J. E. Whitfield.	G. P. Merrill, A. J. S., XXXII, p. 202, 1896.	Trachyte-obsidian dust.	
SO_3 0.18 Li_2O none	Two Ocean Pass, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, B. U. S. G. S., 148, p. 132, 1897.	Trachyte tuff.	
FeS_2 2.21 CuO trace	Los Cerillos, New Mexico.	F. W. Clarke.	Diller and Clarke, B. U. S. G. S., 42, p. 43, 1887.	Trachyte.	Not fresh.
	Puente del Inca, Cord. de Mendoza, Argentina.	R. Müller.	A. Stelzner, Btr. G. Arg. Rep., I, p. 183, 1885.	Trachyte.	Sum high.
	Newtownhead, County Waterford, Ireland.	Jones and Robinson.	F. R. C. Reed, Q. J. G. S., LVI, p. 686, 1900.	Trachyte.	Alkalies low.
	La Quenille, Mount Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., XXVIII, p. 1097, 1899.	Trachyte.	
	Bruhl Thal, Laacher See, Rhenish Prussia.	W. Bruhns.	W. Bruhns, cf. N. J., 1892, II, p. 418.	Trachyte pumice.	Not fresh.
	Laacher See, Rhenish Prussia.	W. Bruhns.	W. Bruhns, cf. N. J., 1892, II, p. 418.	Trachyte pumice.	Al_2O_3 high?
X 0.40 SO_3 0.10 SrO trace Li_2O trace	Block in Tuff, Dachberg, Rhöngebirge.	Knoevenagel.	F. Rinne, Jb. Pr. G. L-A., VII, p. 20, 1887.	Soda-trachyte (?)	
X 0.40 SO_3 0.03 Li_2O trace	Block in Tuff, Dachberg, Rhöngebirge.	Deicke.	F. Rinne, Jb. Pr. G. L-A., VII, p. 21, 1887.	Soda-trachyte (?)	

TRACHYTE—Continued.

No.	Si_2O	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
15 B4. V	54.58	21.85	4.87	n. d.	0.68	1.89	3.51	5.02	8.47					none	100.87	
16 B4. V	60.70	19.70	9.20	n. d.	1.20	1.92	2.40	4.53	0.99				trace		100.64	
17 A4. IV	60.17	17.40	10.20	n. d.	trace	3.55	4.20	4.64	0.43				trace		100.59	2.666
18 B4. V	59.80	18.30	7.10	n. d.	trace	4.30	4.47	3.50	1.85				trace		99.32	2.509
19 B4. V	58.20	21.40	8.60	n. d.	trace	4.50	6.22		1.42				trace		100.34	
20 B4. V	55.80	20.00	10.80	n. d.	trace	5.22	3.00	5.20	0.58						100.60	
21 B4. V	67.30	20.75		n. d.	1.05	2.63	2.75	4.60	0.34						99.42	2.541
22 D3. V	63.22	16.26	1.41	3.84	1.25	4.75	2.42	4.18	1.87				1.07	trace	100.27	2.481
23 D3. V	63.26	16.05	1.04	6.13	1.29	5.50	1.62	3.18	1.57				0.51	0.14	100.29	2.416
24 D4. V	59.36	27.27	n. d.	3.16	n. d.	3.99	1.11	1.65	3.38					0.14	100.06	
25 D3. V	57.97	17.65	0.63	7.50	1.71	5.53	1.50	5.31	1.82				0.42	0.09	100.13	2.451
26 D2. V	55.44	18.60	2.09	4.48	4.75	6.76	1.79	6.63	0.25			0.16	trace		100.75	2.700
27 B4. V	60.76	20.08	4.46	n. d.	trace	2.07	5.70	6.31	1.37						100.75	
28 C4. V	59.65	17.82	4.46	n. d.	0.61	2.35	5.95	7.29	n. d.						99.01	
29 D4. V	59.38	18.40	4.33	n. d.	0.57	2.24	5.42	6.68	0.24			trace		0.38	98.48	
30 D4. V	59.34	18.48	4.59	n. d.	0.77	2.54	5.12	6.75	n. d.			0.19		0.31	98.90	
31 D4. V	59.17	18.65	4.50	n. d.	0.59	2.62	4.82	7.12	0.81					0.20	98.65	
32 D4. V	58.18	18.29	4.63	n. d.	0.68	2.47	5.27	6.93				0.25		0.27	97.87	
33 D4. V	57.68	22.15	4.74	n. d.	1.42		2.04	12.06	n. d.				0.12	trace	101.06	2.613

TRACHYTE—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Schiffenberg, Giessen, Hesse.	F. Roth.	F. Roth, cf. N. J., 1892, II, p. 418.	Trachyte-pumice.	Not fresh.
		Fintaer Straz, Eperies Mountains, Hungary.	Steiner.	S. Roth, F. K., XIV, p. 533, 1884.	Amphibole-trachyte.	Al_2O_3 high or alkalies low?
		Krivi Javor, Eperies Mountains, Hungary.	Steiner.	S. Roth, F. K., XIV, p. 540, 1884.	Amphibole-trachyte.	No MgO?
		Klauzura, Eperies Mountains, Hungary.	Steiner.	S. Roth, F. K., XIV, p. 544, 1884.	Amphibole-trachyte.	No MgO?
		Josefstollen, Dubnik, Hungary.	Steiner.	S. Roth, F. K., XIV, p. 547, 1884.	Augite-trachyte.	Al_2O_3 high. Alkalies not separated. No MgO?
		Sosufalu, Eperies Mountains, Hungary.	Steiner.	S. Roth, F. K., XIV, p. 541, 1884.	Augite-trachyte.	Al_2O_3 high. No MgO?
		Monte Amiata, Tuscany, Italy.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 458, 1887.	Trachyte.	Alkalies low?
		Torre Alfina, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 93.	Olivine-trachyte.	Alkalies low. Calc. with 19.4 per cent quartz.
		San Lorenzo, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 93.	Olivine-trachyte.	Alkalies low. Calc. with 23.3 per cent quartz.
		Valle Vidona, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 101.	Trachyte tuff.	Al_2O_3 high. Alkalies low.
		Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 97.	Trachyte.	Alkalies low. Cf. No. 1, vulsinose.
		Fontana Fiescoli, Viterbo, Italy.	H. S. Washington.	H. S. Washington, J. G., IV, p. 837, 1896.	Ciminite.	Al_2O_3 high and MgO low. Cf. No. 5, ciminose.
Cl	trace	Procida Island, Bay of Naples, Italy.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 475, 1887.	Obsidian.	Al_2O_3 high.
Cl	0.88	Below St. Elmo, Naples, Italy.	G. Freda.	G. Freda, cf. N. J., 1892, II, p. 255.	Trachyte scoria.	
Cl	0.84	Monte Santo, Naples, Italy.	G. Freda.	G. Freda, cf. N. J., 1892, II, p. 255.	Trachyte.	
Cl	0.81	Rione Amedeo, Naples, Italy.	G. Freda.	G. Freda, cf. N. J., 1892, II, p. 255.	Trachyte.	
Cl	0.17	Rione Amedeo, Naples, Italy.	G. Freda.	G. Freda, cf. N. J., 1892, II, p. 255.	Trachyte.	
Cl	0.89	Monte Santo, Naples, Italy.	G. Freda.	G. Freda, cf. N. J., 1892, II, p. 255.	Trachyte.	
Cl	0.85	Sant' Elmo, Naples, Italy.	L. dell' Erba.	L. dell' Erba, cf. B. Com. G. Ital., XXII, p. 105, 1891.	Sanidinite.	

TRACHYTE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
34 A4. IV	59.48	16.87	8.55	n. d.	2.30	5.29	3.79	3.85	n. d.						100.13	
35 B4. V	71.5	16.9		n. d.	0.3	1.2	6.5	2.8							99.6	
36 B4. V	60.2	10.2	11.9	n. d.	2.9	6.1	6.0	3.1	n. d.						100.2	
37 C4. V	61.49	20.82	5.03	n. d.	0.51	1.98	3.10	7.03	n. d.				0.03	0.01	100.0	
38 D4. V	65.5	20.0	5.0	n. d.	2.6	0.7	0.4	7.0	0.8			trace			102.0	
39 A3. III	63.63	17.99	5.84	trace	none	4.21	4.25	3.81	0.15					0.69	100.57	2.307 (powder)
40 C3. V	70.34	10.13	0.56	4.02	1.74	5.18	5.01	2.06	2.14						101.18	2.525
41 C4. V	61.38	20.60	2.57	n. d.	0.40	2.18	9.70	none	1.98					1.19	100.00	2.590
42 C4. V	60.69	17.75	3.83	n. d.	1.43	1.20	13.10	trace	0.79					1.21	100.00	
43 C4. V	52.18	20.00	5.00	n. d.	1.03	4.92	14.57	2.30	n. d.						100.00	

NEPHELITE-SYENITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 D4. V	50.36	19.34	6.94	n. d.	n. d.	3.43	7.64	7.17	3.51					0.41	98.80	
2 A4. IV	52.10	19.86	5.94	n. d.	2.35	0.25	7.82	10.05	1.43						99.80	
3 D2. V	54.17	23.25	0.69	2.95	0.48	2.02	6.33	6.19	0.17		1.14	0.98		0.16	98.53	
4 D2. V	52.03	22.34	1.13	1.63	0.67	2.09	8.44	5.16	1.79		1.32	0.99		0.41	98.00	
5 B4. V	55.41	19.84	9.50	n. d.	n. d.	3.86	5.97	5.29	n. d.						99.87	

TRACHYTE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Grotta dei Palizzi, Vulcano Island, Italy.	Heidepriem.	A. Bergeat, Abh. Munch. Ak., XX, p. 166, 1899.	Olivine-trachyte.	
	Capo Rosso, San Pietro, Sardinia.	S. Bertolio.	S. Bertolio, B. Com. G. Ital., XXV, p. 418, 1894.	Trachyte.	
	Acqua Fredda, Siliqua, Sardinia.	S. Bertolio.	S. Bertolio, B. Soc. G. Fr., XXIII, p. 454, 1895.	Trachyte.	
	Golabara River, Servia.	A. B. Griffiths.	A. B. Griffiths, Q. J. G. S., XLII, p. 566, 1886.	Trachyte.	
	San Miguel, Azores Islands.	S. Traverso.	S. Traverso, Gior. Min., V, p. 197, 1894.	Augitic trachyte.	
	Bondi, Sydney, New South Wales.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XX, p. 235, 1887.	Pumice.	Floated block.
	Tawheterangi, Hauraki Penins, New Zealand.	W. A. McLeod.	W. A. McLeod, Tr. N. Z. Inst., XXXI, p. 490, 1899.	Hornblende-trachyte.	"Silicified?"
	Lyttleton Crater, New Zealand.	Geological Survey of New Zealand.	H. Filhol, III, p. 115, 1885.	Soda-trachyte.	Alkalies?
	Lyttleton Crater, New Zealand.	Geological Survey of New Zealand.	H. Filhol, III, p. 115, 1885.	Soda-trachyte.	Alkalies?
	Lyttleton Crater, New Zealand.	Geological Survey of New Zealand.	H. Filhol, III, p. 115, 1885.	Soda-trachyte.	Alkalies?

NEPHELITE-SYENITE.

	Beemerville, Sussex County, New Jersey.	F. W. Love.	J. F. Kemp, Tr. N. Y. Acad., XI, p. 65, 1892.	Nephelite-syenite.	Complete in separate.
	Poços de Caldas, Minas Geraes, Brazil.	J. Machado.	J. Machado, T. M. P. M., IX, p. 342, 1888.	Nephelite-syenite.	Calculated from two partial analyses.
	Mount Wichniowaia, East Urals, Siberia.	Bourdakow.	A. Karpinsky, Guide Exc. VII Cong. G. Int., V, p. 22, 1897.	Miascite.	Cf. No. 38, miaskose.
	Lake Ilmen, Siberia.	Bourdakow.	A. Karpinsky, Guide Exc. VII Cong. G. Int., V, p. 22, 1897.	Miascite.	Cf. No. 38, miaskose.
	Alibert's Graphite Mine, Botolgolskij-Golez, Siberia.	Alexejew.	L. Jaczewski, cf. N. J., 1901, II, p. 75.	Nephelite-syenite.	Contains graphite.

PHONOLITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A4. IV	44.50	22.96	6.84	n. d.	1.65	8.65	6.70	4.83	2.06			1.40			99.59	
2 A4. IV	58.98	16.03	n. d.	8.27	trace	1.11	8.28	4.90	2.07	0.51					100.15	
3 A4. IV	58.94	18.11	n. d.	6.31	trace	0.57	7.56	6.87	1.36	0.09					99.81	
4 B4. V	58.65	16.45	4.08	n. d.	trace	3.78	8.92	4.16	2.78	0.29					99.11	
5 A4. IV	58.58	17.19	n. d.	7.69	none	0.88	9.26	4.54	1.65	0.09					99.78	
6 A4. IV	58.56	18.14	n. d.	7.32	none	1.56	8.49	5.28	1.01	0.12					100.48	
7 A4. IV	58.38	20.40	n. d.	4.42	trace	1.56	6.23	6.26	2.70	0.50					100.45	
8 A4. IV	57.45	20.38	n. d.	3.63	trace	1.84	7.41	6.19	2.76	0.36					100.02	
9 A4. IV	56.34	21.06	n. d.	4.21	0.71	3.34	9.27	4.08	0.90	0.07					99.98	
10 A4. IV	55.60	19.71	n. d.	5.49	0.86	1.69	8.60	4.88	2.89	0.34					100.06	
11 A1. I	56.74	20.30	1.06	none	0.23	0.57	0.62	13.36	1.15	0.33		0.58	0.25	none	100.10	
12 A4. IV	61.3	21.2	n. d.	3.9	0.7	0.2	10.2	2.7	n. d.						100.2	2.60
13 C4. IV	58.70	22.36	5.08	n. d.	1.27	3.39	5.13	5.45	n. d.				trace		101.38	
14 D4. V	54.97	25.84	6.29	n. d.	1.13	5.21	4.49	3.52	n. d.				trace		101.45	
15 D3. V	55.90?	22.70	4.20	n. d.	0.96	1.25	9.20?	6.78	0.87			0.37			102.23	
16 B2. III	53.33	21.33	2.66	1.75	0.63	1.44	10.34	6.13	0.88			0.40		1.15?	100.04	
17 D3. V	53.09	23.81?	3.92	n. d.	1.13	1.29	10.41	6.31	0.67			0.29		0.42	101.34	
18 B3. IV	53.21	22.02	4.18	n. d.	0.91	1.33	10.37	6.41	0.81			0.35		0.42	100.01	
19 A4. IV	52.24	21.08	4.41	n. d.	0.60	2.68	4.58	6.43	8.33						100.43	
20 C2. IV	57.69	20.44	2.32	1.47	0.70	3.18	7.51	4.74	1.70		0.42	0.66		trace	101.79	2.624

PHONOLITE.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Dr. Thornton's, Magnet Cove, Arkansas.	W. A. Noyes.	J. F. Williams, A. R. Akr. G. S. 1890, II, p. 261, 1891.	Nephelite-porphyry.	
		Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Acad., XII, p. 272, 1899.	Phonolite.	
		Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Acad., XII, p. 272, 1899.	Phonolite.	
		Calamity Gulch, Black Hills, South Dakota.	J. D. Irving.	J. D. Irving, Ann. N. Y. Acad., XII, p. 272, 1899.	Phonolite.	
		Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Acad., XII, p. 272, 1899.	Phonolite.	
		Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Acad., XII, p. 272, 1899.	Phonolite.	
		Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Acad., XII, p. 272, 1899.	Phonolite.	
		Whitetail Gulch, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Acad., XII, p. 272, 1899.	Phonolite.	
		Squaw Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Acad., XII, p. 272, 1899.	Phonolite.	
		Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Acad., XII, p. 272, 1899.	Phonolite.	
ZrO_2 FeS_2 BaO SrO Li_2O	0.07 4.65 0.19 trace trace	Victor, Cripple Creek, Colorado.	W. F. Hillebrand.	W. C. Cross, B. U. S. G. S., 148, p. 162, 1897.	Altered phonolite.	
		Megal, Velay, France.	M. Boule.	M. Boule, B. Serv. Cte. G. Fr., IV, No. 28, p. 152, 1892.	Phonolite.	
SO_3	trace	Roc Blanc, Mount Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Phonolite.	
		La Malvialle, Mount Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Phonolite.	
		Foia, Serra de Monchique, Portugal.	Student of P. Jannasch.	Kraatz-Koschlau and Hackman, T. M. P. M., XVI, p. 257, 1896.	Tinguaite-porphyry.	Sum high. SiO_2 and Na_2O doubtful.
		Foia, Serra de Monchique, Portugal.	Student of P. Jannasch.	Kraatz-Koschlau and Hackman, T. M. P. M., XVI, p. 257, 1896.	Tinguaite-porphyry.	MnO doubtful. Na_2O high?
		Foia, Serra de Monchique, Portugal.	Student of P. Jannasch.	Kraatz-Koschlau and Hackman, T. M. P. M., XVI, p. 257, 1896.	Tinguaite-porphyry.	Al_2O_3 doubtful. Sum high.
		Foia, Serra de Monchique, Portugal.	Students of P. Jannasch.	Kraatz-Koschlau and Hackman, T. M. P. M., XVI, p. 257, 1896.	Tinguaite-porphyry.	Mean of 3 above, doubtful determinations omitted.
SO_3 Cl	trace 0.08	Schorenberg, Eifel, Rh. Prussia.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn., XLVIII, p. 254, 1891.	Phonolite tuff.	
X SO_3 Cl	0.34 0.27 0.35	Linsberg, Rhöngebirge.	E. Möller.	E. Möller, N. J. 1888, I, p. 97.	Phonolite.	

PHONOLITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
21 B4. V	56.72	21.04	n. d.	4.63	1.13	4.13	4.33	6.28				1.74			100.00	
22 B4. V	56.47	18.66	n. d.	5.83	trace	4.79	7.81	4.87							100.00	
23 B4. V	52.03	20.00	n. d.	5.90	1.52	4.42	9.30	5.22				1.32		0.22	99.93	
24 B4. V	50.70	20.32	n. d.	4.51	2.09	3.58	5.05	6.23				5.68			100.00	
25 C4. V	50.69	21.85	n. d.	4.51	0.25	7.77	11.28	2.83				0.82			100.00	
26 B4. V	50.66	21.18	n. d.	5.42	2.65	7.72	5.06	3.77				2.15		0.25	100.00	
27 D4. V	49.69	21.05	n. d.	5.05	1.45	8.90	4.22	1.33	5.23		1.35		trace		98.68	
28 D4. V	52.85	15.50	11.70	n. d.	4.58	7.56	n. d.	7.54	n. d.						102.73	
29 C3. V	58.23	20.90	3.21	1.75	0.39	3.24	6.16	5.88	1.60					trace	101.36	
30 C4. V	51.15	29.38		n. d.	0.34	4.59	13.80	0.95							100.21	

LEUCITE-TRACHYTE, ETC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A4. IV	50.96	19.67	7.76	n. d.	0.36	4.38	7.96	6.77	1.38			0.52			100.01	
2 A4. IV	52.16	20.14	6.45	n. d.	1.54	4.64	5.73	8.12	1.39			trace	trace		100.17	
3 B4. V	55.22	23.34	2.16	n. d.	0.36	2.25	3.14	5.72	8.76						101.09	
4 B4. V	53.25	24.20	3.37	n. d.	trace	1.03	5.73	5.48	6.64						99.70	
5 A4. IV	50.95	21.43	3.50	n. d.	trace	4.87	6.81	6.66	10.20						100.46	
6 B4. V	52.33	21.42	n. d.	8.14	1.97	7.88	4.97	2.57				0.72			100.00	
7 D3. V	59.69	16.22	1.93	8.17	2.72	4.80	1.03	3.09	1.54				trace	0.44	100.27	

PHONOLITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Kirchberg, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 221.	Phonolite.	Not fresh. Recalc. to 100, after deducting 3.36 H_2O and 4.56 $CaCO_3$.
	Endhalde, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 235.	Phonolite.	Not fresh. Recalc. to 100, after ignition and deducting 6.82 CO_2.
	Eichwälde, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 225.	Hauyne-phonolite.	Ignited before analysis. SO_3 not determined.
FeS_2 1.84	Schelingen, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 239.	Phonolite.	TiO_2 high. Not fresh. 4.16 H_2O and 6.27 $CaCO_3$ deducted.
	Oberschaffhausen, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 232.	Natrolite-phonolite.	Not fresh. 6.74 H_2O and 2.00 $CaCO_3$ deducted.
SO_3 1.14	Herberig, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 218.	Phonolite.	Not fresh. 6.35 H_2O and 3.07 $CaCO_3$ deducted.
SO_3 0.41 Cl none	Herberig, Kaiserstuhl, Baden.	H. Köhler.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 224.	Hauyne-phonolite.	Sum low. Not fresh.
	Le Braidi, Monte Vulture, Italy.	Musaio.	Cf. W. Deecke, N. J. B. B., VII, p. 602, 1891.	Phonolite.	
	Greenland Harbor, Kerguelen Island, South Atlantic.	C. Klement.	A. Renard, Challenger Reports, Petr. Oc. Islands, p. 136, 1889.	Phonolite.	
	Purakanui Cliffs, n. Dunedin, New Zealand.	Allen and Fitzgerald.	G. H. F. Ulrich, Tr. Aust. A. A. S., III, p. 136, 1891.	Tinguaite?	

LEUCITE-TRACHYTE, ETC.

SO_3 trace Cl 0.25	Diamond Jo Quarry, Magnet Cove, Arkansas.	W. A. Noyes.	J. F. Williams, A. R. Ark. G. S., 1890, II, p. 276, 1890.	Leucite-syenite.	
	Serra de Caldas, Sao Paolo, Brazil.	F. W. Dafert.	E. Hussak, N. J., 1892, II, p. 149.	Leucitophyre.	
SO_3 trace Cl 0.14	Bell, Laacher See, Rh. Prussia.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn., XLVIII, p. 265, 1891.	Leucitophyre-pumice.	Not fresh. Al_2O_3 high?
Cl trace	Rieden, Laacher See, Rh. Prussia.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn., XLVIII, p. 246, 1891.	Leucite-phonolite pumice.	Not fresh. Al_2O_3 high?
Cl trace	Rieden, Laacher See, Rh. Prussia.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn., XLVIII, p. 244, 1891.	Leucitophyre pumice.	Not fresh.
	Oberrothweil, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 229.	Leucite-phonolite.	Not fresh. 7.00 H_2O and 4.30 $CaCO_3$ deducted?
SO_3 0.64 Cl trace	Proceno, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 113.	Leucite-phonolite.	Alkalies low calc. with 21.5 quartz.

QUARTZ-DIORITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A4. IV	56.69	15.48	6.22	n. d.	6.53	7.59	3.41	3.43	n. d.			0.62			99.97	
2 A4. IV	56.18	22.79		n. d.	6.53	6.49	3.40	3.27	n. d.			1.60			100.26	
3 D4. V	57.50	23.44	5.07	n. d.	2.76	5.62	2.01	0.45	2.25				2.02		101.12	2.856
4 A1. I	60.26	15.73	1.25	2.68	1.82	5.44	1.92	3.71	2.54	0.33	3.99	0.42	0.12	0.04	100.40	
5 A1. I	59.76	14.45	1.04	3.52	2.26	6.09	1.12	3.73	2.58	0.26	4.47	0.46	0.16	0.09	100.28	
6 A1. I	58.43	17.40	0.77	2.19	1.50	5.25	1.76	4.03	2.61	0.30	4.04	none	0.13	none	100.00	
7 A1. I	56.25	17.65	0.76	2.64	1.69	4.46	0.30	6.01	2.36	0.30	4.82	0.25	0.21	none	100.60	
8 A1. I	46.13	15.82	0.89	2.27	2.13	10.68	0.17	5.30	2.42	0.12	11.24	0.67	0.10	0.09	99.68	
9 A3. III	68.99	20.29	2.10	1.62	0.40	4.75	0.15	0.09	0.14	—	1.10	trace	trace	none	99.63	
10 A2. II	57.96	17.43	0.45	1.82	2.34	5.07	5.17	0.45	1.04	—	6.32	1.21	0.02	none	99.61	
11 A4. IV	65.20	16.25	5.45	n. d.	1.87	7.55	2.87	0.50	0.65						100.34	
12 A4. IV	64.35	15.46	7.50	n. d.	0.50	3.58	3.28	3.54	n. d.			1.63			99.84	
13 A4. IV	64.02	20.45	2.85	n. d.	1.28	4.51	3.34	3.54	n. d.						99.59	
14 D3. V	65.73	16.20	2.66	1.68	1.28	3.12	4.12	1.89	1.47						98.15	
15 A4. IV	62.80	12.94	10.57	n. d.	2.79	4.99	2.52	1.27	1.13			1.10			100.11	
16 C2. IV	56.45	20.15	4.36	5.00	2.66	6.59	2.95	1.00	1.61			trace	0.24	trace	101.01	
17 C4. V	62.22	23.29		n. d.	3.22	6.21	2.69	1.27	0.14						99.04	
18* A4. IV	56.61	15.55	12.66	n. d.	2.07	5.90	3.15	1.07	3.50						100.51	
19 C4. V	56.17	16.50	10.60	n. d.	2.21	6.97	2.94	0.75	3.01						99.15	

QUARTZ-DIORITE.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Three Rivers, Belchertown, Massachusetts.	W. Orr, jr.	B. K. Emerson, M. U. S. G. S., XXIX, p. 336, 1898.	Tonalite.	
		Three Rivers, Belchertown, Massachusetts.	F. H. Fitts.	B. K. Emerson, M. U. S. G. S., XXIX, p. 336, 1898.	Tonalite.	
		Stop Island, Rainy Lake Region, Ontario.	F. T. Shutt.	A. C. Lawson, A. G., VII, p. 158, 1891.	Quartz-diorite.	Center of dike. Al_2O_3 high.
FeS_2 BaO SrO Li_2O	0.08 0.07 trace trace	Providence Mine, Nevada County, California.	W. F. Hillebrand.	W. Lindgren, 17 A. R. U. S. G. S., II, p. 149, 1896.	Altered granodiorite.	Cf. No. 34, yellowstonose, and No. 11, harzose.
FeS_2 BaO SrO Li_2O	0.24 0.05 trace? trace	Providence Mine, Nevada County, California.	W. F. Hillebrand.	W. Lindgren, 17 A. R. U. S. G. S., II, p. 149, 1896.	Altered granodiorite.	Cf. No. 34, yellowstonose, and No. 11, harzose.
SO_3 FeS_2 BaO	none 1.59 none	Empire Mine, Nevada County, California.	G. Steiger.	W. Lindgren, 17 A. R. U. S. G. S., II, p. 149, 1896.	Altered granodiorite.	Cf. No. 34, yellowstonose, and No. 11, harzose.
SO_3 FeS_2 BaO	none 2.87 0.08	Bellefountain Tunnel, Nevada County, California.	G. Steiger.	W. Lindgren, 17 A. R. U. S. G. S., II, p. 149, 1896.	Altered granodiorite.	Cf. No. 34, yellowstonose, and No. 11, harzose.
SO_3 FeS_2 NiO ZnO BaO SrO	0.04 1.61 trace trace trace trace	Ophir, Placer County, California.	W. F. Hillebrand.	W. Lindgren, 14 A. R. U. S. G. S., II, p. 275, 1894.	Altered granodiorite.	Cf. No. 59, tonalose.
S	trace	Smith's Post Island, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Ess. River, p. 45, 1900.	Quartz-diorite.	Decomposed.
FeS_2	0.33	Omai, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Ess. River, p. 45, 1900.	Quartz-diorite.	Decomposed.
		Monte Santo, Sao Paolo, Brazil.	J. Machado.	J. Machado, T. M. P. M., IX, p. 355, 1888.	Quartz-augite-diorite.	
		Dypvik, Farsund, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 123.	Banatite.	
		Kockenhus, Kullen, Sweden.	A. Hennig.	A. Hennig, cf. N. J., 1900, I, p. 224.	Banatite.	Al_2O_3 high?
		Rino, Val Camonica, Piedmont.	C. Riva.	C. Riva, Att. Soc. Ital. Milano, XXXVI, p. 146, 1896.	Quartz-diorite.	
		Mésoncles, Valsavaranche, Piedmont.	G. Aichino.	V. Novarese, B. Com. G. Ital., XXV, p. 286, 1894.	Quartz-diorite.	
		Ivrea, Piedmont.	L. van Wervecke.	F. R. Van Horn, T. M. P. M., XVII, p. 407, 1898.	Quartz-hypersthene-diorite.	Al_2O_3 high?
		Kamary, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII, Cong. G. Int., XXXIII, p. 27, 1897.	Quartz-diorite.	
		Aiou Dag, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII, Cong. G. Int., XXXIII, p. 27, 1897.	Quartz-diorite.	
		Tschamny-Burun, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII, Cong. G. Int., XXXIII, p. 27, 1897.	Quartz-diorite.	

QUARTZ-DIORITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
20 B4. V	55.69	14.20	11.52	n. d.	1.62	8.14	4.01	1.00	3.15						99.33	
21 B4. V	63.93	17.25	5.90	n. d.	2.03	4.74	2.93	3.29	0.80						100.87	
22 A4. IV	62.95	17.61	4.59	n. d.	2.15	5.06	3.30	3.34	0.68						99.68	
23 A4. IV	60.70	18.55	6.21	n. d.	2.56	5.10	2.54	3.70	1.18						100.54	

DIORITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 D4. V	52.47	25.54	6.31	n. d.	2.31	6.62	3.23	0.54	1.28				1.16		99.46	2.870
2 A1. I	58.01	15.72	0.64	3.87	2.07	2.15	0.10	4.79	2.71	0.31	2.86	1.08	0.31	0.17	100.24	
3 B3. IV	46.65	16.29	n. d.	10.54	8.13	13.22	2.78	trace	1.56		0.57	1.03	trace	trace	100.77	
4 D4. V	58.67	14.89	7.56	n. d.	1.79	5.68	7.69	2.69	0.57					1.00	100.54	
5 C3. V	60.13	17.49	2.89	3.35	5.30	3.72	4.42	3.02	1.04						101.36	
6 B3. IV	49.55	12.72	5.28	9.57	4.45	7.37	3.15	trace	3.31		4.75			trace	100.15	
7 C3. V	48.50	14.15	7.15	8.26	6.65	10.77	1.97	0.12	3.10		trace			0.33	101.10	
8 D4. V	48.40	14.30	16.20	n. d.	6.94	11.09	1.55	0.06	3.25		trace			trace	103.40	
9 A3. III	55.72	21.35	n. d.	8.81	0.63	5.10	5.71	1.23	0.46			0.57		0.36	99.94	
10 B3. IV	53.77	20.86	n. d.	5.93	2.76	5.04	5.01	2.87	1.86			1.21			99.31	
11 C3. V	54.59	21.26	2.76	3.41	1.61	4.84	6.36	4.96	1.32						101.11	
12 C3. V	65.73	17.85	0.93	3.88	1.59	2.81	4.06	3.83	0.79						101.47	
13 A2. II	57.35	14.61	2.18	3.99	3.96	3.51	2.93	1.92	4.08		4.16	0.81	0.25		99.97	2.666
14 A4. IV	55.40	16.80	9.25	n. d.	5.19	7.60	3.60	1.39	1.25						100.48	

QUARTZ-DIORITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks
	Buyuk Ouraga, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII, Cong. G. Int., XXXIII, p. 27, 1897.	Quartz-diorite.	
	Cap Marsa, Ménerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 106, 1900.	Microtonalite.	
	Cap Marsa, Ménerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 101, 1900.	Tonalite.	
	Cap Marsa, Ménerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 106, 1900.	Microtonalite.	

DIORITE.

	Whitefish Bay, Rainy Lake, Ontario.	F. T. Shutt.	A. C. Lawson, A. G., VII, p. 161, 1891.	Diorite.	Center of dike. Al_2O_3 high.
S 1.25 As 1.65 Fe 1.52 Ni 0.12 Pb 0.86 Cu 0.05	Croesus Mine, Hailey, Idaho.	W. F. Hillebrand.	W. Lindgren, 20 A. R. U. S. G. S., III, p. 219, 1900.	Altered diorite.	Cf. No. 15 andose.
S trace	Summit of Mount St. Elias, Alaska.	E. Mattirolo.	V. Novarese, in Filippi and Sella, Sped. Duca Abruz. a Mount St. El., 1897, p. (5).	Diorite.	
	Washoe County, Nevada.	J. W. Phillips.	W. C. Day, 18 A. R. U. S. G. S., V, p. 969, 1897.	Diorite.	"Granite." Alkalies high?
	Rio Colorado, Juncal Valley, Argentina.	R. Müller.	A. Stelzner, Btr. G. Arg. Rep., I, p. 212, 1885.	"Andendiorit."	
	Revin, Faux Valley, Belgium.	C. Klement.	C. Klement, cf. N. J. 1890, I, p. 71.	Diorite.	Not fresh. K_2O?
FeS 0.10	Notre Dame de Meuse, Belgium.	C. Klement.	C. Klement, cf. N. J. 1890, I, p. 71.	Diorite.	
S 1.61	Bet. Mairus and Laifour, Belgium.	C. Klement.	C. Klement, cf. N. J. 1890, I, p. 71.	Diorite.	Sum high?
	Kortfors, Örebro, Sweden.	H. Santesson.	H. Bäckström, G. F. F., XVI, p. 108, 1894.	Kugel in granite.	
	Slättmossa, Sweden.	H. Bäckström.	H. Bäckström, G. F. F., IX, p. 360, 1887.	Kugel in granite.	
	Wirvik, Finland.	B. Frosterus.	B. Frosterus, T. M. P. M., XIII, p. 188, 1892.	Kugel in granite.	MgO high? cf. loc. cit.
	Lippenhof, Schwarzwald, Baden.	Alibegoff.	G. H. Williams, N. J. B. B., II, p. 624, 1883.	Mica-diorite.	
SO_3 0.20 Org. 0.02	Litzelkopf, Birkenfeld, Harz Mountains.	Bärwald.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 266, 1892.	Diorite-porphyrite.	Not fresh.
	Kisowa, Schemnitz, Hungary.	C. v. John?	C. v. John, Jb. Wien. G. R-A., XXXVIII, p. 350, 1888.	Augite-diorite.	

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.70	2.40	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.70	2.40	161.06
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.00	1.60	101.40
[illegible]	[illegible]	[illegible]	1.00	[illegible]	[illegible]	1.10	9.98	9.98	1.00		100.76

DIORITE—Continued

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Jablanica, Herzegovina.	C. v. John?	C. v. John, Jb. Wien. G. R-A., XXXVIII, p. 349, 1888.	Augite-diorite.	
	Val Moja, Edolo, Lombardy.	C. Riva.	C. Riva, Att. Soc. Ital. Mil., XXXVI, p. 141, 1896.	Diorite.	
	Passo di Campo, Lago d'Arno, Lombardy.	C. Riva.	C. Riva, Att. Soc. Ital. Mil., XXXVII, p. 84, 1897.	Diorite.	
	Lago d'Arno, Lombardy.	C. Riva.	C. Riva, Att. Soc. Ital. Mil., XXXVII, p. 84, 1897.	Diorite.	Al_2O_3 high?
	Val Moja, Edolo, Lombardy.	C. Riva.	C. Riva, cf. N. J., 1897, II, p. (64).	Diorite-porphyrite.	Iron oxides?
	Beresowka, Ural Mountains, Russia.	Loewinson-Lessing.	Loewinson-Lessing, G. Sk. Jushno. Dorpat., 1900, p. 244.	Syenite-diorite.	
	Supreya, Ural Mountains, Russia.	Loewinson-Lessing.	Loewinson-Lessing, G. Sk. Jushno. Dorpat., 1900, p. 166.	Microdiorite.	
	Assa, Caucasus.	L.-Lessing and Krikmeyer-	Loewinson-Lessing, cf. N. J., 1899, II, p. 234.	Metadiorite.	
	Caucasus.	L.-Lessing and Krikmeyer.	Loewinson-Lessing, cf. N. J., 1899, II, p. 234.	Metadiorite.	Not fresh.
	Ménerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 32, 1900.	Microdiorite.	
	Arthur's Seat, Shevaroy Hills, Madras, India.	T. L. Walker.	T. H. Holland, Mem. G. S. India, XXVIII, p. 151, 1900.	Hypersthene-diorite.	

ESSEXITE.

	Monchique, Portugal.	Scholar of P. Jannasch.	K-Koschlau and Hackman, T. M. P. M., XVI, p. 239, 1896.	Essexite.	
SO_3 trace	Penikkavaara, Kuusamo, Finland.	A. Zilliacus.	V. Hackman, B. Com. G. Finl., No. 11, p. 29, 1900.	Essexitic rock.	Low sum due to H_2O?

KERSANTITE.

	Hôpital Camfront, Brittany.	Not stated.	C. Barrois, Guide Exc. VIII Cong. G. Int., VII, p. 19, 1900.	Aplitic kersantite.	
	Hôpital Camfront, Brittany.	Not stated.	C. Barrois, Guide Exc. VIII Cong. G. Int., VII, p. 19, 1900.	Kersantite.	
	Hôpital Camfront, Brittany.	Not stated.	C. Barrois, Guide Exc. VIII Cong. G. Int., VII, p. 19, 1900.	Kersantite.	Alkalies?
	Croix de Fer, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Serv. Cte. G. Fr., VI, No. 40, p. 50, 1894.	Kersantite.	

KERSANTITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
5 C4. V	66.30	15.30	5.40	n. d.	2.60	0.90	2.80	4.60	1.20						99.10	
6 B4. V	66.04	13.30	8.40	n. d.	2.20	1.60	3.40	4.70	1.10						100.74	
7 C2. IV	48.45	15.57	5.07	4.86	4.28	10.48	3.57	2.15	2.23		1.57	2.15	0.80		101.18	
8 B2. III	52.68	14.05	4.87	7.88	6.58	1.75	2.79	2.30	6.03			0.40	trace	trace	99.33	2.77
9 A4. IV.	49.82	14.50	8.06	n. d.	5.81	7.69	3.03	3.50	2.54		4.42			trace	99.57	
10 A4. IV.	45.14	9.68	13.55	n. d.	10.78	8.65	2.02	3.27	4.24		2.82		trace	trace	100.15	
11 B3. IV.	55.95	19.47	4.09	1.08	4.24	7.84	$\underbrace{\qquad\qquad}_{2.64}$		3.78			1.60			100.69	

PORPHYRITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A4. IV	51.93	18.13	8.92	n. d.	5.30	9.82	4.34	1.42	0.69							
2 A1. I	49.47	12.15	1.93	4.07	10.86	9.30	2.08	2.42	4.14		3.31	0.21	0.37	0.10	100.44	
3 C4 V	62.20	21.18	1.42	n. d.	trace	2.20	9.60	2.60	(0.80)						100.00	
4 D4. V	57.50	27.61	2.00	n. d.	2.17	2.10	6.11	1.30	1.91						100.70	
5 C4. V	52.59	18.57	8.62	n. d.	9.18	1.94	1.12	3.99	3.11						99.11	
6 B4. V	47.60	19.10	11.55	n. d.	6.95	7.82	3.50	1.94	2.98						101.44	
7 D3. V	49.17	14.59	3.91	12.94	4.32	8.78	3.68	0.79	0.58						98.76	
8 D3. V	65.35	15.78	2.39	3.18	2.62	1.59	3.45	4.94	2.29						101.59	2.648
9 A2. II	50.81	15.90	3.60	3.72	7.18	3.67	3.32	0.81	6.80		2.35	1.06	0.27		99.75	2.643
10 B4. V	64.86	16.67	6.92	n. d.	2.52	2.19	4.21	2.15	n. d.			0.14	0.13		99.79	2.663
11 C3. V	54.44	19.97	7.52	0.52	5.15	3.11	2.26	3.58	4.18						100.73	2.62
12 A4. IV.	45.45	16.78	n. d.	15.66	3.07	10.19	2.77	1.42	2.85		2.03				100.22	

KERSANTITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	La Balme, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Serv. Cte. G. Fr., VI, No. 40, p. 50, 1894.	Kersantite.	
	Croix de Fer, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Serv. Cte. G. Fr., VI, No. 40, p. 50, 1894.	Kersantite.	
	Stöitrenna, Gran, Norway.	V. Schmelck,	W. C. Brögger, Eg. Kg., III, p. 81, 1899.	Kersantite.	Not fresh.
S trace	Bärenstein, Thuringia.	R. Pöhlmann.	R. Pöhlmann, N. J. B. B., III, p. 100, 1885.	Kersantite.	Not fresh. Border of dike; cf. No. 4, kilauose.
S trace	Falkenstein, Thuringia.	R. Pöhlmann.	R. Pöhlmann, N. J. B. B., III, p. 97, 1885.	Kersantite.	Not fresh.
S trace	Göhren, Thuringia.	R. Pöhlmann.	R. Pöhlmann, N. J. B. B. III, p. 97, 1885.	Kersantite.	Not fresh.
	Zabehlice, Prague, Bohemia.	J. Nevole.	B. Macha, Cf. Geol. Centralbl., I, p. 513, 1901.	Spessartite.	Not fresh.

PORPHYRITE.

	Kennebunkport, Maine.	H. A. Flint.	J. F. Kemp, A. G., V, p. 138, 1890.	Augite-porphyrite.	
Cr_2O_3 trace BaO 0.03	East Gallatin River, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 645, 1895.	Porphyrite.	Not fresh.
	Clermain, Saone-et-Loire, France.	Not stated.	Levy and Lacroix, B. Serv. Cte. G. Fr., VII, No. 45, p. 6, 1895.	Mica-porphyrite.	H_2O by difference.
	Clermain, Saone-et-Loire, France.	Not stated.	Levy and Lacroix, B. Serv. Cte. G. Fr., VII, No. 45, p. 7, 1895.	Mica-porphyrite.	Al_2O_3 high.
	Pelvoux, France.	P. Termier?	P. Termier, C. R., CXXIV, p. 635, 1897.	Porphyrite.	Not fresh.
	Pelvoux, France.	P. Termier?	P. Termier, C. R., CXXIV, p., 635, 1897.	Porphyrite.	Fresh.
	Föglö, Finland.	H. Berghell.	B. Frosterus, Finl. G. Und., Bl. 25, p. 23, 1894.	Labradorite-porphyrite.	
	St. Amariner Thal, Vogesen.	P. Eitner.	A. Osann, Abh. Kte. E. L., III, p. 132, 1887.	Labradorite-porphyrite.	
SO_3 0.21 Org 0.05	Oberstein, Nahe, Rh. Prussia.	Bärwald.	K. Lossen, Jb. Pr. G. L-A., X, p. 309, 1892.	Labradorite-porphyrite.	Not fresh.
	Hasenberg, Magdeburg, Hesse.	Bodländer.	F. Klockmann, Jb. Pr. G. L-A., XI, p. 210, 1892.	Augite-porphyrite.	Al_2O_3 high?
	Potschappel, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII, p. 748, 1886.	Hornblende-porphyrite.	Al_2O_3 high? Iron oxides?
	Mühlenthal, Harz Mountains.	Streng.	K. A. Lossen, Jb. Pr. G. L-A., VI, p. 213, 1886.	Labradorite-porphyrite.	

PORPHYRITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
13 B2. III.	75.21	11.78	2.89	0.55	0.31	1.94	2.84	2.63	1.85				0.74	0.26	101.00	
14 C2. IV.	72.36	12.88	4.54	0.27	0.93	2.31	4.63	1.99	1.19				0.13	0.12	101.35	
15 A4. IV.	63.44	16.66	6.94	n. d.	3.15	5.14	1.81	2.24	0.85						100.23	
16 B4. V.	52.90	18.54	7.03	n. d.	8.22	6.11	n. d.	n. d.	1.07						(93.87)	
17 D3. V.	53.71	25.51	7.19	1.74	1.24	4.60	4.50	1.15	0.20						99.84	
18 C4. V.	47.77	20.95	12.27	n. d.	0.54	8.18	4.31	1.88	2.26				0.43	1.05	99.64	
19 A4. IV.	57.00	17.71	7.92	n. d.	1.39	2.96	6.66	4.08	1.69				trace	trace	100.05	2.68
20 A4. IV.	48.18	16.55	11.05	n. d.	7.35	11.19	3.66	0.46	1.48			trace			99.92	3.04
21 A4. IV.	47.77	15.87	13.82	n. d.	5.97	11.95	3.97	0.22	1.02			trace			100.59	3.05
22 B4. V.	68.00	12.56	3.26	n. d.	4.20	5.28	4.57	0.95	2.11						100.93	
23 B3. IV	47.43	16.65	11.29	1.28	5.77	10.84	1.58	2.37	3.50						100.71	
24 A4. IV	56.71	17.92	8.13	n. d.	4.27	7.67	2.59	0.44	3.22						100.35	
25 D4. V	54.10	15.91	7.18	n. d.	5.83	6.91	3.76	0.64	3.98						98.31	
26 B4. V	49.57	19.59	13.83	n. d.	7.25	3.82	1.20	0.36	5.19						100.81	
27 B3. IV	48.97	21.32	0.58	7.20	10.55	4.94	2.04	0.42	3.90						99.92 (99.42)	
28 B4. V	46.27	16.87	14.70	n. d.	5.97	3.73	7.86	0.87	3.08						99.35	

PORPHYRITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Near Cimic, Moldauthal, Bohemia.	Neumann.	J. Klvana, Cf. N. J., 1898, I, p. 485.	Porphyrite.	
	Klecanky, Moldauthal, Bohemia.	Neumann.	J. Klvana, Cf. N. J., 1898, I, p. 485.	Porphyrite.	
	Cernygraben, Bacher Mountains, Styria.	A. Pontoni.	A. Pontoni, T. M. P. M., XIV, p. 371, 1895.	Mica-porphyrite.	
	Miessling, Bacher Mountains, Styria.	A. Pontoni.	A. Pontoni, T. M. P. M., XIV, p. 372, 1895.	Porphyrite.	Alkalies not determined.
	Val Moja, Adamello, Tyrol.	C. Riva.	C. Riva, Cf. N. J., 1897, II, p. 64.	Hornblende-porphyrite.	Al_2O_3 high. Iron oxides?
	Valdieri, Alpi Marittimi, Piedmont.	Aichino.	S. Franchi, B. Com. G. Ital., XXV, p. 245, 1894.	Hornblende-porphyrite.	Al_2O_3 high. MgO low.
	Val Sabbia, Brescia, Italy.	C. Riva.	C. Riva, Gior. Min., IV, p. 200, 1893.	Hornblende-porphyrite.	
	Colle Sagnette, Valley of the Po, Italy.	Aichino.	S. Franchi, B. Com. G. Ital., XXXI, p. 127, 1900.	Porphyrite.	
	Lobbia di Viso, Valley of the Po, Italy.	Aichino.	S. Franchi, B. Com. G. Ital., XXXI, p. 127, 1900.	Porphyrite.	
	Jalguba, Olonez, Russia.	Not stated.	Loewinson-Lessing, Cf. N. J., 1890, II, p. 267.	Augite-porphyrite.	
	Jalguba, Olonez, Russia.	Not stated.	Loewinson-Lessing, cf. N. J., 1890, II, p. 267.	Augite-porphyrite.	Iron oxides.
	Alouchta, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc., VII, Cong. G. Int., XXXIII, p. 27, 1897.	Quartz-porphyrite.	
	Kourtzy, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc., VII, Cong. G. Int., XXXIII, p. 27, 1897.	Porphyrite.	
	Caucasus.	Jastrzembesky.	Loewinson-Lessing, cf. N. J., 1899, II, p. 234.	Porphyrite.	
	Caucasus.	Jastrzembesky.	Loewinson-Lessing, cf. N. J., 1899, II, p. 234.	Porphyrite.	Sum incorrect.
	Roschka, Caucasus.	Makerow.	Loewinson-Lessing, cf. N. J., 1899, II, p. 234.	Augite-porphyrite.	

CAMPTONITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A4. IV	38.45	19.68	4.01	11.15	6.65	9.37	2.77	1.72	1.49		4.82			trace	100.11	
2 D4. V	41.00	21.36	13.44	n. d.	3.85	10.40	2.86	1.31	5.00						99.22	
3 B4. V	48.19	16.79	18.37	n. d.	1.32	6.85	5.59	1.11	2.31						100.53	
4 C4. V	44.85	17.20	11.20	n. d.	5.02	7.52	1.39	2.99	2.39			6.58		trace	99.58	
5 B4. V	43.50	17.02	13.68	n. d.	6.84	8.13	2.84	3.02	4.35						99.40	
6 D2. V	42.05	12.30	3.81	9.52	4.83	11.55	2.18	1.11	2.88		2.68	5.60			98.51	
7 D2. V	41.40	13.28	6.54	8.63	5.26	10.05	2.43	0.75	3.17		4.18	2.75			98.44	
8 D3. V	54.67	12.68	11.69	2.13	6.11	4.96	3.85	3.65	2.10						101.84	

DACITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A4. IV	68.20	16.98	3.75	n. d.	2.07	4.33	2.98	1.52	0.44						100.27	
2 A3. III	65.78	14.87	1.27	1.00	1.89	2.41	2.58	2.71	4.32	2.87			0.08	trace	99.78	
3 D4. V	66.85	14.08	3.06	n. d.	0.91	4.69	3.80	2.57	2.07						98.03	2.53
4 D3. V	66.03	14.57	2.57	1.19	1.89	3.38	3.71	2.70	2.07				0.09		98.20	
5 B4. V	68.32	19.61		n. d.	1.95	4.24	4.06	1.45	0.54						100.17	2.765
6 A4. IV	68.05	17.95	2.97	n. d.	1.40	3.65	3.56	1.25	1.78				trace	trace	100.61	
7 B4. V	68.97	17.03	1.30	n. d.	0.79	3.26	5.15	1.70	1.10						99.30	
8 D3. V	65.29	20.15	5.57	1.13	0.16	2.11	2.52	1.24	1.19						99.36	
9 D3. V	65.75	18.38	2.00	1.30	1.52	3.70	4.04	4.11	1.20					0.20	102.20	
10 A4. IV	68.47	14.67	3.93	n. d.	0.32	3.89	2.34	3.42	2.59						100.63	

CAMPTONITE.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Campton Falls, Grafton County, New Hampshire.	L. G. Eakins.	J. P. Iddings, B. U. S. G. S. 150, p. 241, 1898.	Camptonite.	TiO_2 not determined. Not fresh.
	Proctor, Vermont.	J. F. Kemp.	Kemp and Marsters, A. G., IV, p. 101, 1889.	Camptonite.	Not fresh. TiO_2 not determined. Al_2O_3 high.
	Forest of Dean, Orange County, New York.	J. F. Kemp.	J. F. Kemp, A. J. S., XXXV, p. 332, 1888.	Camptonite.	
	Fort Montgomery, Hudson River, New York.	Dennis.	Kemp and Dennis, Am. Naturalist, Aug., 1886.	Camptonite.	
	Fairhaven, Hampton County, New York.	J. F. Kemp.	Kemp and Marsters, A. G., IV, p. 101, 1889.	Camptonite.	Not fresh.
	Egge, Gran, Norway.	L. Schmelck.	W. C. Brögger, Q. J. G. S., L., p. 26, 1894.	Camptonite.	Sum low. Not fresh.
	Hougen, Gran, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 60, 1899.	Camptonite.	Sum low. Not fresh.
	Waldmichelbach, Spessart, Bavaria.	E. Goller.	E. Goller, N. J. B. B., VI, p. 566, 1889.	Camptonite.	

DACITE.

	Lassen Peak, California.	T. M. Chatard.	J. S. Diller, B. U. S. G. S., 150, p. 218, 1898.	Dacite.	
	Near Paskenta, Tehama County, California.	G. Steiger.	J. S. Diller, B. U. S. G. S., 148, p. 194, 1897.	Dacite tuff.	
	Seal Harbor, San Clemente Island, California.	W. S. T. Smith.	W. S. T. Smith, 18 A. R. U. S. G. S., II, p. 488, 1898.	Dacite.	
	Hondon, Chiles Volcano, Colombia.	R. Küch.	R. Küch, G. Stud. Colomb., I, p. 179, 1892.	Dacite.	
	Mojanda, Quito, Ecuador.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 458, 1887.	Dacite.	
	Cerro Quimsa Chata, Bolivia.	F. Rudolph.	F. Rudolph, T. M. P. M., IX, p. 311, 1888.	Dacite.	
	Cerros Blancos, San Juan, Argentina.	R. E. Teichgräber.	A. Stelzner, B. tr. G. Arg. Rep., I, p. 184, 1885.	Dacite.	
	Garbanzal, Cabo de Gata, Spain.	Hauff.	A. Osann, Z. D. G. G., XLIII, p. 706, 1891.	Dacite.	Al_2O_3 high.
	Mount Elbruz, Caucasas.	A. Dannenberg.	A. Dannenberg, T. M. P. M., XIX, p. 233, 1900.	Dacite.	Sum high.
	Cap Blanc, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 59, 1900.	Dacite.	In addition 2.32 s.

DACITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O—	H_2O—	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
11 D4. V	67.71	17.25	4.21	n. d.	1.43	4.38	3.13	2.90	1.35						102.36	
12 C4. V	67.47	19.07	1.05	n. d.	0.24	4.87	3.87	3.89	0.84						101.30	
13 C4. V	63.00	17.40	5.03	n. d.	1.02	5.71	3.89	4.81	0.48						101.34	
14 A4. IV	59.24	18.45	4.58	n. d.	2.06	6.08	3.15	3.22	3.66						100.44	
15 B4. V	58.29	23.66		n. d.	1.93	6.75	1.59	2.32	5.63						100.17	

ANDESITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O—	H_2O—	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 D2. V	63.25	14.89	6.54	none	0.82	0.59	4.47	4.78	3.20		0.78	trace	0.61		99.93	
2 C3. V	52.94	14.70	2.52	7.80	4.49	6.56	3.09	0.04	2.04		4.86				99.04	
3 B4. V	54.86	15.04	4.92	3.11	1.88	9.19	11.30		n. d.				0.46		100.76	
4 A3. III	69.51	15.61	0.56	1.27	0.61	2.80	3.43	2.81	3.63			trace			100.23	
5 A3. III	62.94	18.14	n. d.	3.82	3.06	6.28	3.83	1.22	0.60			0.41	0.10		100.40	
6 A4. IV	58.97	18.60	5.94	n. d.	6.89	2.84	3.05	2.24	1.35						99.88	
7 D3. V	60.00	19.01	3.20	0.68	1.28	4.10	6.97	2.79	4.30					trace	102.33	2.51 —2.54
8 A4. IV	55.80	18.22	8.98	n. d.	2.23	4.40	6.34	1.90	2.30						100.17	2.72
9 B3. IV	67.83	15.02	n. d.	5.16	0.29	3.07	2.40	3.20	1.11			1.04	0.26		99.38	
10 A4. IV	59.22	18.20	n. d.	6.69	2.90	5.51	1.39	3.31	2.80						100.02	
11 A4. IV	58.44	18.17	n. d.	6.03	2.40	6.19	3.20	1.97	0.76		2.87				100.03	
12 B4. V	56.71	18.36	n. d.	6.45	3.92	6.11	3.52	2.38	1.94						99.39	
13 B3. IV	49.80	15.33	n. d.	7.44	6.61	7.19	2.71	4.36	1.38		2.56	2.67	0.73	0.30	101.08	

DACITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Dra Zeg Etter, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 129, 1900.	Dacite.	Sum high.
	Cap Blanc, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 59, 1900.	Dacite.	
	Cap Blanc, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 59, 1900.	Dacite.	
	Dra Zeg Etter, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 129, 1900.	Dacite.	H_2O includes CO_2.
	Dra Zeg Etter, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 129, 1900.	Dacite.	H_2O includes CO_2.

ANDESITE.

	North Haven, Fox Islands, Maine.	Magruder and Jones.	G. O. Smith, In. Diss., Johns Hopkins Univ., 1896, p. 33.	Andesite.	Does not correspond with mode.
	Ely, Minnesota.	C. F. Sidener.	N. H. Winchell, 23 A. R. G. Nh. S. Minn., p. 204, 1895.	Felsite.	Not fresh.
	Mount Tacoma, Washington.	F. Collischon.	K. Oebbeke, N. J., 1885, I, p. 226.	Andesite.	Alkalies high and not separated.
	Stillwater Creek, Lassen Peak, California.	W. H. Melville.	J. S. Diller, B. U. S. G. S., 150, p. 212, 1898.	Andesite, tuff.	
	Lassen Peak, California.	P. W. Shimer.	Hague and Iddings, A. J. S., XXVI, p. 225, 1883.	Andesite.	
	Lassen Peak, California.	T. M. Chatard.	J. S. Diller, B. U. S. G. S., 148, p. 193, 1897.	Secretion in dacite.	Al_2O_3 high. TiO_2 not determined.
	Carmelo Bay, California.	J. Posada.	A. C. Lawson, B. Dep. G. Un. Cal., I, p. 42, 1893.	Carmeloite.	Sum high. Al_2O_3 high and MgO low.
	Point Sal, California.	H. W. Fairbanks.	H. W. Fairbanks, B. Dep. G. Un. Cal., II, p. 50, 1896.	Andesite.	
	Hoosac Mountain, Eureka, Nevada.	R. W. Mahon.	Hague and Iddings, M. U. S. G. S., XX, p. 264, 1892.	Andesite.	Cf. Iddings, B. U. S. G. S., 150, p. 221, 1898.
	Silver Terrace, Washoe, Nevada.	W. G. Mixter.	G. F. Becker, M. U. S. G. S., III, p. 152, 1882.	Pyroxene-andesite.	Cf. Hague and Iddings. B.U.S.G.S., 17, p. 33, 1885.
	American Flat, Washoe, Nevada.	W. G. Mixter.	G. F. Becker, M. U. S. G. S., III, p. 152, 1882.	Pyroxene-andesite.	Cf. Hague and Iddings. B. U.S. G. S. 17, p. 33, 1885.
	Eldorado, Washoe, Nevada.	R. W. Woodward.	G. F. Becker, M. U. S. G. S., III, p. 152, 1882.	Pyroxene-andesite.	Cf. Hague and Iddings, B. U. S. G. S., 3.17, p. 33, 1885.
	Near Grant's, Mount Taylor Region, New Mexico.	T. M. Chatard.	J. S. Diller, B. U. S. G. S., 148, p. 185, 1897.	Mica-andesite.	Not fresh.

ANDESITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
14 A3. III	45.31	9.96	3.43	12.99	2.56	16.44	0.41	0.25	3.77		5.39				100.51	
15 A4. IV	61.24	18.32	6.17	n. d.	3.76	5.06	3.15	2.37	0.67						100.74	2.612
16 A4. IV	61.06	15.42	8.01	n. d.	3.55	7.11	2.66	1.40	0.68			trace	trace	trace	99.89	2.658
17 A4. IV	59.84	18.57	4.76	n. d.	2.95	4.69	2.85	2.72	4.10						100.48	2.177
18 A2. II	53.68	16.96	5.00	2.41	1.79	10.18	3.55	0.76	0.48		4.40	0.88	0.51		100.60	2.736
19 C4. V	56.73	20.44	5.71	n. d.	2.58	7.23	3.73	2.45	0.54						99.41	
20 B4. V	59.13	17.00	7.03	n. d.	n. d.	6.67	4.80	1.37	0.16						96.16	
21 C4. V	57.24	18.02	3.46	4.13	3.77	7.78	5.54		0.06						100.00	
22 A4. IV	60.34	15.66	n. d.	8.13	2.11	6.97	5.12	0.90	0.87						100.10	
23 B4. V	62.80	16.36	n. d.	7.11	3.05	3.63	4.50	0.80	1.00						99.25	2.561
24 B4. V	62.30	14.46	n. d.	7.71	2.14	5.35	4.80	1.72	0.98						99.46	2.664
25 D4. V	60.10	15.56	n. d.	7.83	1.22	5.97	5.11	1.69	0.95						98.43	
26 D3. V	55.64	21.45	5.41	6.58	3.10	5.59	3.08	1.60	n. d.						102.45	
27 A4. IV	68.18	16.86	6.12	n. d.	0.71	5.35	2.40	0.21	0.73				trace	trace	100.56	
28 A4. IV	68.05	17.95	2.97	n. d.	1.40	3.65	3.56	1.25	1.78				trace	trace	100.61	
29 D4. V	65.39	17.20	6.39	n. d.	trace	5.74	2.73	0.47	0.59				trace	trace	98.51	
30 D4. V	63.86	16.52	5.91	n. d.	1.60	3.71	3.16	2.47	0.93					trace	98.16	
31 C3. V	54.58	23.21	5.33	2.44	0.76	11.37	2.69	n. d.	n. d.						100.38	
32 B4. V	56.50	28.20		n. d.	0.98	2.83	6.68	4.25	n. d.						99.44	
33 B2. III	56.03	12.51	0.45	15.73	6.08	4.17	2.01	0.73	0.70			0.74		0.19	99.34	

ANDESITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	St. Thomas, West Indies.	J. v. Siemiradzki.	J. v. Siemiradzki, N. J., 1886, II, p. 178.	Anorthite-andesite.	Not fresh.
	Mount Iztaccihuatl, Mexico.	H. Lenk?	H. Lenk in Felix and Lenk, Btr. G. Mex., II., p. 229, 1899.	Hornblende-andesite.	
	Cerro Guerrero, north of Mexico City, Mexico.	König.	H. Lenk in Felix and Lenk, Btr. G. Mex., I, p. 100, 1890.	Hypersthene-andesite.	
	Amecameca, Mexico.	H. Lenk?	H. Lenk in Felix and Lenk, Btr. G. Mex., II, p. 229, 1899.	Andesite-pumice.	
SO_3 trace	Ejutla, Oaxaca, Mexico.	A. Röhrig.	H. Lenk in Felix and Lenk, Btr. G. Mex., II, p. 140, 1899.	Hypersthene-andesite.	Not fresh.
	Irazu Volcano, Carthago, Costa Rica.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 467, 1887.	Andesite.	Al_2O_3 high.
	Cerro Negro, Mayasquer, Colombia.	Buntzel.	R. Küch, G. Stud. Colomb., I, p. 183, 1892.	Pyroxene-andesite.	MgO not determined.
	Pasto Volcano, Colombia.	R. Küch.	R. Küch, G. Stud. Colomb., I, p. 141, 1892,	Pyroxene-andesite.	Alkalies by difference.
	Zechzech, Alausi, Ecuador.	J. v. Siemiradzki.	J. v. Siemiradzki, N. J. B. B., IV, p. 209, 1886.	Andesite.	
	Zechzech, Alausi, Ecuador.	J. v. Siemiradzki.	J. v. Siemiradzki, N. J. B. B., IV, p. 209, 1886.	Hornblende-andesite.	
	Zechzech, Alausi, Ecuador.	J. v. Siemiradzki.	J. v. Siemiradzki, N. J. B. B., IV, p. 209, 1886.	Augite-andesite.	
	Zechzech, Alausi, Ecuador.	J. v. Siemiradzki.	J. v. Siemiradzki, N. J. B. B., IV, p. 209, 1886.	Hornblende-augite-andesite.	Sum low.
	Rio Chanchan, Ecuador.	J. v. Siemiradzki.	J. v. Siemiradzki, N. J., 1885, I, p. 156.	Hypersthene-andesite.	Sum high. Al_2O_3 high.
	Sajama Volcano, Bolivia.	F. Rudolph.	F. Rudolph, T. M. P. M., IX, p. 306, 1888.	Hornblende-andesite.	
	Cerro Quimsa Chata, Bolivia.	F. Rudolph.	F. Rudolph, T. M. P. M., IX, p. 311, 1888.	Hornblende-andesite.	
	Sajama Volcano, Bolivia.	F. Rudolph.	F. Rudolph, T. M. P. M., IX, p. 306, 1888.	Hornblende-andesite.	Sum low.
	Sajama Volcano, Bolivia.	F. Rudolph.	F. Rudolph, T. M. P. M., IX, p. 299, 1888.	Hornblende-phyroxene-andesite.	Sum low.
	Osorno Volcano, Chile.	W. Bruhns.	W. Bruhns, cf. N. J., 1899, II, p. 85.	Augite-andesite.	Al_2O_3 high.
	Chatham Bay, Cocos Island, Galapagos Islands.	G. P. Merrill.	G. P. Merrill, B. Mus. Comp. Zool., XVI, No. 13, p. 237, 1893.	Andesite?	
	Burnt Hill, King Charles Land, Spitzbergen.	N. Sahlbom.	A. Hamberg, G. F. F., XXI, p. 523, 1899.	Hypersthene-andesite.	Scoria.

ANDESITE—Continued.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
[illegible]	[illegible]	[illegible]	[illegible]	4.37	6.30	2.88	2.38	0.75	0.83			0.80		trace	99.51	
[illegible]	[illegible]	[illegible]	n. d.	[illegible]	2.55	6.53	4.54	3.18	n. d.			3.26		0.68	100.03	
[illegible]	[illegible]	[illegible]	[illegible]	n. d.	0.33	2.74	6.93	1.51	2.83					trace	100.71	
[illegible]	[illegible]	[illegible]	[illegible]	n. d.	0.37	3.61	4.01	2.91	1.41						99.24	
[illegible]		[illegible]	[illegible]	[illegible]	4.24	6.87	2.98	1.08	1.55					0.27	98.97	
[illegible]	[illegible]	[illegible]	[illegible]	n. d.	0.93	11.45	2.49	1.91	0.70						100.16	
[illegible]	[illegible]	[illegible]	[illegible]	n. d.	0.89	2.01	4.15	6.08	2.70						100.08	
[illegible]	[illegible]	[illegible]	[illegible]	2.94	3.00	4.86	2.67	1.81	3.09						98.51	2.543
[illegible]	[illegible]	[illegible]	[illegible]	n. d.	2.33	2.80	5.02	4.13	4.20						99.81	
[illegible]	[illegible]	[illegible]	[illegible]	n. d.	2.22	7.06	2.21	1.86	2.43						100.49	2.705
[illegible]	[illegible]	[illegible]	[illegible]	3.67	4.05	8.03	2.22	1.28	n. d.						99.17	
[illegible]	[illegible]	[illegible]	10.10	n. d.	4.46	7.04	2.58	1.59	1.50						98.56	
[illegible]	[illegible]	[illegible]	[illegible]	n. d.	4.68	6.18	2.38	0.77	1.70						99.76	2.81
[illegible]	[illegible]	[illegible]	[illegible]	n. d.	2.29	11.20	2.04	1.38	1.55		3.60				100.16	
48 [illegible]	48.37	20.74	6.56	0.63	6.35	7.77	1.70	none	1.60		6.00		0.94		100.66	
49 B4 V	61.8	16.5	6.7	n. d.	1.2	4.5	7.2	1.4	0.6						99.9	
50 B1 V	60.15	14.54	12.31	n. d.	1.97	trace.	4.01	6.56	1.51				trace		100.05	2.68
51 B1 V	63.17	18.76	3.74	n. d.	1.12	7.10	3.93	1.09	1.47				0.40	trace	101.08	
52 D1 V	62.91	18.31	5.55	n. d.	1.97	5.93	3.67	1.66	2.17				0.37		102.54	
53 C1 V	61.58	18.84	4.68	n. d.	2.04	6.59	4.27	1.49	1.61				0.27	trace	101.37	

ANDESITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Burnt Hill, King Charles Land, Spitzbergen.	N. Sahlbom.	A. Hamberg. G. F. F., XXI, p. 523, 1899.	Hypersthene-andesite.	Scoria.
	Floated block, Temple Bay, Spitzbergen.	H. Bäckström.	H. Bäckström, Bih. Sv. Vet. Ak. Hd., XVI, Pt. II, p. 39, 1890.	Augite-andesite.	Pumice.
	Beinn Hiant, Island of Mull, Scotland.	T. H. Holland.	J. W. Judd, Q. J. G. S., XLVI, p. 379, 1890.	Andesite.	
	Beinn Talaidh, Island of Mull, Scotland.	T. H. Holland.	J. W. Judd, Q. J. G. S., XLVI, p. 349, 1890.	Andesite.	
	Cleveland Dike, Mull, Scotland.	Stock.	J. W. Judd, Q. J. G. S., XLVI, p. 379, 1890.	Tholeiite.	
	Beinn Hiant, Island of Mull, Scotland.	W. Tate.	J. W. Judd, Q. J. G. S., XLVI, p. 379, 1890.	Tholeiite.	
	Scuir of Eigg, Scotland.	B. North.	J. W. Judd, Q. J. G. S., XLVI, p. 379, 1890.	Andesite.	
	Carhope, Cheviot Hills, Scotland.	Petersen?	J. J. H. Teall, G. M., XXII, p. 118, 1885.	Hypersthene-andesite.	Sum low.
	Tormore, Arran, Scotland.	M. M. Tait.	J. W. Judd, Q. J. G. S., XLIX, p. 558, 1893.	Pitchstone (andesite).	
S. 0.45	Cirmhor Dike, Arran, Scotland.	Under Thorpe.	J. W. Judd, Q. J. G. S., XLIX, p. 545, 1893.	Augite-andesite.	Border of dike.
	Bardon, Charnwood Forest, England.	Lord.	Hill and Bonney, Q. J. G. S., XLVII, p. 89, 1891.	Andesite.	
	Armathwaite, England.	W. F. K. Stock.	J. J. H. Teall, Q. J. G. S., XL, p. 224, 1884.	Andesite.	
	Acklington, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 243, 1884.	Andesite.	
	Preston, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 224, 1884.	Andesite.	Not fresh.
	Killerton, Devonshire, England.	E. Haworth.	B. Hobson, Q. J. G. S., XLVIII, p. 507, 1892.	Mica-augite-andesite.	Not fresh. Al_2O_3 high. No K_2O.
	Carn Bodnan, Caernarvonshire, Wales.	E. H. Acton.	A. Harker, Bala Volc. Series, 1889, p. 69.	Pyroxene-andesite.	
	Carn Fawr, Penbrokeshire, Wales.	F. E. Tadman.	F. R. C. Reed, Q. J. G. S., LI, p. 192, 1895.	Tachylyte.	
	Boulevie, Esterel, France.	Rüst.	A. Michel-Levy, B. Serv. Cte. G. Fr., No. 57, p. 19, 1897.	Esterellite.	
	La Touchque, Esterel, France.	Rüst.	A. Michel-Levy, B. Serv. Cte. G. Fr., No. 57, p. 21, 1897.	Esterellite.	
	Dramont, Esterel France.	Rüst.	A. Michel-Levy, B. Serv. Cte. G. Fr., No. 57, p. 19, 1897.	Esterellite.	

ANDESITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
54 D4. V	59.50	18.49	6.38	n. d.	2.15	5.65	4.19	1.69	3.57				0.35		101.97	
55 D4. V	57.63	18.43	4.59	n. d.	2.38	7.18	3.92	1.30	5.20				0.28	trace	100.91	
56 D3. V	55.01	15.69	4.78	5.79	6.20	11.21	1.19	1.55	0.65						102.07	2.837
57 C3. V	54.26	15.93	6.80	5.53	3.35	11.32	1.94	1.10	0.99					0.27	101.49	2.770
58 C3. V	53.13	15.61	2.33	8.23	5.80	11.75	1.86	1.78	0.73						101.22	2.555
59 D4. V	52.27	19.27	n. d.	8.82	3.18	5.86	3.44	4.69	—		—	2.47			100.00	
60 B4. V	62.54	23.56		n. d.	1.15	4.75	3.16	2.43	1.75						99.35	2.694
61 B4. V	62.30	17.45	5.50	n. d.	1.21	4.20	2.95	2.90	2.70						99.21	2.595
62 C4. V	63.92	21.09	n. d.	3.88	0.72	4.61	1.04	2.86	1.50					trace	99.62	
63 B4. V	54.20	19.72	n. d.	10.49	2.46	9.40	2.05	0.64	0.68						99.64	
64 D4. V	53.99	24.27	n. d.	7.35	2.39	9.23	1.59	0.75	0.55						100.10	
65 A4. IV	57.48	16.82	8.49	n. d.	4.64	5.45	2.63	4.57	0.25						100.33	
66 B4. V	56.77	20.02	6.40	n. d.	3.70	5.40	4.01	3.94	0.13						100.36	
67 D3. V	59.06	16.40	2.88	4.18	2.63	4.32	5.29	1.49	2.06				trace		98.31	2.606 22°
68 A4. IV	66.11	12.10	7.74	n. d.	1.70	4.09	2.86	2.73	2.11	0.08					99.52	
69 A4. IV	59.31	16.95	n. d.	8.07	1.65	4.30	1.59	3.42	2.64	2.10			0.40		100.43	
70 A4. IV	62.20	15.40	7.74	n. d.	2.09	5.95	3.25	2.45	0.13	0.13			0.46		99.80	
71 A4. IV	57.38	18.13	9.23	n. d.	1.93	8.50	2.44	1.36	0.41	0.20			0.34		99.92	
72 I4. V	57.60	14.71	8.55	n. d.	4.98	7.54	3.46	1.87	0.73	0.05			0.82		100.31	

ANDESITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Dramont, Esterel, France.	Rüst.	A. Michel-Levy, B. Serv. Cte. G. Fr., No. 57, p. 21, 1897.	Esterellite.	
	Les Cours, Esterel, France.	Rüst.	A. Michel-Levy, B. Serv. Cte. G. Fr., No. 57, p. 19, 1897.	Esterellite.	
	Alboran Island, Spain.	H. Graber.	F. Becke, T. M. P. M., XVIII, p. 544, 1899.	Alboranite.	Sum high.
	Alboran Island, Spain.	H. Graber.	F. Becke, T. M. P. M., XVIII, p. 544, 1899.	Alboranite.	
	Isla de la Nube, Alboran Island, Spain.	H. Graber.	F. Becke, T. M. P. M., XVIII, p. 544, 1899.	Alboranite.	
	Horberig, Kaiserstuhl, Baden.	A. Knop.	A. Knop, Der Kaiserstuhl, 1892, p. 259.	Andesite.	**Calc to 100 after deducting2.27 H_2O and 3.1 $CaCO_3$ Not fresh.**
	Hlinikerthal, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 467, 1887.	Andesite.	
	Bohunitz, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 467, 1887.	Andesite.	
	Bujaker Wald, Cserhat, Hungary.	A. Kalecsinsky.	F. Schafarzik, Mt. Hung. G. A., IX, p. 301, 1895.	Pyroxene-andesite.	Al_2O_3 high.
	Peleske, Cserhat, Hungary.	A. Kalecsinsky.	F. Schafarzik, Mt. Hung. G. A., IX, p. 258, 1895.	Pyroxene-andesite.	Al_2O_3 high.
	Peleske, Cserhat, Hungary.	A. Kalecsinsky.	F. Schafarzik, Mt. Hung. G. A., IX, p. 258, 1895.	Pyroxene-andesite.	Al_2O_3 high.
	Passo di Campo, Adamello, Tyrol.	C. Riva.	C. Riva, cf. N. J., 1898. II, p. 247.	Malchite.	
	Lago d'Arno, Adamello, Tyrol.	C. Riva.	C. Riva, cf. N. J., 1898, II, p. 247.	Malchite.	
	Punta della Manza, Capraia Island, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 142, 1893.	Andesite.	
	Pizza del Corvo, Panaria, Æolian Islands.	F. Glaser.	A. Bergeat, Sb. Münch. Ak., XX, p. 59, 1899.	Hornblende-andesite.	
	Monte Sant' Angelo, Lipari, Æolian Islands.	F. Glaser.	A. Bergeat, Sb. Münch. Ak., XX, p. 102, 1899.	Cordierite-andesite.	
	Capo Graziano, Filicudi, Æolian Islands.	F. Glaser.	A. Bergeat, Sb. Münch. Ak., XX, p. 214, 1899.	Cordierite-andesite.	
	Summit Filicudi, Lipari Islands.	F. Glaser.	A. Bergeat, Sb. Münch. Ak., XX, p. 208, 1899.	Pyroxene-andesite.	
	Summit Alicudi, Lipari Islands.	F. Glaser.	A. Bergeat, Sb. Münch. Ak., XX, p. 219, 1899.	Olivine-pyroxene-andesite.	

ANDESITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
7[illegible] [illegible]	[illegible]	[illegible]	5.27	n. d.	0.47	7.18	2.06	1.08	0.42				1.46	0.17	100.75	
7[illegible] [illegible]	[illegible]	[illegible]	2.67	n. d.	1.57	4.72	1.90	1.80	3.03				1.36	0.21	100.17	
7[illegible] [illegible]	[illegible]	[illegible]	7.64	n. d.	2.45	6.04	4.02	3.09	0.31				0.16	0.29	100.32	
7[illegible] [illegible]	[illegible]	12.34	7.32	n. d.	3.99	8.06	1.29	2.67	0.30				0.23	0.34	100.36	
[illegible] [illegible]	[illegible]	12.06	8.42	n. d.	3.62	8.76	1.46	2.38	1.42				1.12	0.44	100.30 0.53 99.79	
7[illegible] [illegible]	[illegible]	[illegible]4.77		n. d.	0.94	1.93	3.27	2.75	1.76						99.15	
7[illegible] [illegible]	[illegible]	[illegible]7.61		n. d.	trace	4.45	3.04	2.56	1.42						100.13	
8[illegible] [illegible]	[illegible]	17.92		n. d.	trace	5.63	3.35	2.58	2.60						100.07	
8[illegible] [illegible]	[illegible]	[illegible]	7.02	n. d.	2.05	6.99	3.35	0.83	2.20			0.80			100.59	2.74
82 [illegible]	[illegible]	[illegible]	5.30	n. d.	1.78	6.15	3.46	0.91	5.31						100.44	2.62
8[illegible] [illegible]	[illegible]	24.92		n. d.	0.77	2.31	6.47	3.55	1.66						99.00	
8[illegible] [illegible]	[illegible]	[illegible]	n. d.	5.82	5.47	6.92	4.49	1.63	0.20						100.56	
8[illegible] [illegible]	[illegible]	[illegible]	n. d.	5.44	5.34	6.80	3.36	1.79	0.13						99.43	
86 [illegible]	[illegible]	[illegible]	4.41	1.50	1.29	6.98	3.35	1.48	2.80			0.05			99.81	2.503
87 [illegible]	[illegible]	[illegible]	2.37	n. d.	1.53	4.95	3.68	2.69	2.90						101.08	
88 [illegible]	[illegible]	[illegible]	2.06	1.70	3.34	6.17	3.59	1.71	3.20						98.94	
89 [illegible]	[illegible]	17.14	6.39	n. d.	3.30	6.78	2.88	3.87	1.76						97.67	
90 [illegible]	64.54	19.16	7.23	n. d.	3.39	2.47	0.57	1.13	2.25			0.79			101.53	
91 D3. V	57.16	20.06	2.84	1.95	1.55	4.41	5.84	4.52	1.09			2.67		trace	102.09	
92 A4. IV	55.67	16.06	10.80	n. d.	2.93	5.92	3.81	0.51	4.15	——			0.83		100.[illegible]	

ANDESITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Lava of 1888, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 110, 1892.	Andesite.	P_2O_5 high
SO_3 1.04 Cl trace	Eruption, Aug., 1888, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 112, 1892.	Andesite ashes.	P_2O_5 high. 2.67% sol. in H_2O.
SO_3 trace Cl trace	Eruption, Nov., 1888, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 112, 1892.	Andesite ashes.	
SO_3 0.41 Cl 0.08	Eruption, Sept., 1888, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 112, 1892.	Andesite ashes.	1.00% sol. in H_2O.
SO_3 0.21 Cl 2.42	Eruption, Sept., 1888, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 112, 1892.	Andesite ashes.	P_2O_5 high. 4.15% sol. in H_2O.
	Kara Dag, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII. Cong. G. Int., XXXI, p. 13, 1897.	Pyroxene-andesite.	
	Kara Dag, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII. Cong. G. Int., XXXI, p. 13, 1897.	Pyroxene-andesite.	
	Kara Dag, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII. Cong. G. Int., XXXI, p. 13, 1897.	Pyroxene-andesite.	
	Bujuk-Uragi Mt., Crimea, Russia.	R. Prendel.	R. Prendel, cf. N. J., 1887, II, p. 97.	Andesite.	
	Kara Dag, Crimea, Russia.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 473, 1887.	Andesite.	
	S. of Kara Dag, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII. Cong. G. Int., XXXI, p. 13, 1897.	Pyroxene-andesite.	
	Mleti, Caucasus.	L.-Lessing and Krikmeyer.	Loewinson-Lessing, cf. N. J., 1899, II, p. 237.	Andesite.	
	Mleti, Caucasus.	L.-Lessing and Krikmeyer.	Loewinson-Lessing, cf. N. J., 1899, II, p. 237.	Andesite.	
	Stavro Vouno, Ægina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende-andesite.	Al_2O_3 high. MgO low.
	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 89, 1900.	Hornblende-andesite.	
	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 84, 1900.	Hypersthene-andesite.	Mean of 3. Sum low.
	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, No. 2, p. 84, 1900.	Hypersthene-andesite.	Sum low. Mean of 3.
	Harrismith, Orange River Colony, South Africa.	W. P. Jorissen.	G. A. F. Molengraaf, N. J., 1894, I, p. 82.	Cordierite-vitrophyrite.	
	Nightingale Island, Tristan d'Acunha, South Atlantic.	C. Klement.	A. Renard, Chall. Rep. Petr. Oc. Islands, p. 92, 1889.	Andesite tuff.	Sum high.
	Chemerin Kushkek, Elburz Mountains, Persia.	E. Drasche.	E. Drasche, Vh. Wien. G. R-A., 1884, p. 196.	Andesite.	

ANDESITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
93 A4 IV	55.10	19.57	8.52	n. d.	2.01	5.90	3.67	4.77	1.19	——					100.73	
94 A4. IV	50.86	15.65	10.85	n. d.	6.03	11.76	2.01	1.56	0.20			0.63	trace	trace	99.55	3.01
95 B2. III	59.70	16.68	5.43	2.09	2.35	5.20	2.67	0.99	0.90				0.15	0.98	100.34	
96 D4. V	54.66	14.79	8.59	n. d.	0.80	6.08	3.62	2.30	3.93				0.10	0.63	98.95	
97 C3. V	61.28	18.16	5.97	1.76	0.79	3.55	5.51	2.75	1.72					trace	101.49	
98 A4. IV	59.87	17.23	9.96	n. d.	0.77	2.96	6.21	2.92	0.61						100.53	
99 A4. IV	54.44	12.90	7.08	n. d.	12.75	5.12	2.06	0.35	5.54						100.24	2.75
100 A4. IV	53.18	16.18	10.30	n. d.	6.72	10.12	1.85	0.35	1.65						100.35	2.725
101 D3. V	50.87	21.98	5.85	5.09	1.38	9.12	2.85	0.22	0.43					1.45	99.24	
102 A3. III	68.06	15.03	0.28	3.66	0.81	2.71	4.25	3.41	2.12			0.58		trace	100.71	
103 A2. II	66.26	16.31	3.38	1.36	1.66	2.88	4.11	2.23	——			0.66		0.38	100.74	2.438
104 A2. II	60.13	17.41	4.30	1.68	2.27	3.36	4.88	2.46	——			1.10		0.40	100.67	2.607
105 A4. IV	57.76	18.39	7.51	n. d.	3.34	6.21	3.63	2.61	0.94						100.89	2.664
106 A4. IV	53.63	19.59	5.70	n. d.	3.35	3.53	3.64	1.62	7.91			0.96		trace	99.93	
107 B3. IV	57.04	19.51	5.50	2.71	none	8.16	2.83	2.38	0.20					2.05	100.38	2.720 21°
108 B3. IV	56.76	21.10	4.52	3.02	trace	9.01	2.80	3.27	0.24					trace	100.72	2.666 15°
109 B3. IV	56.57	17.82	2.91	2.65	trace	5.11	3.09	2.61	5.98	2.03				0.84	99.61	2.359 21°
110 D4. V	52.60	18.30	12.70	n. d.	4.65	11.05	0.67	0.09	——				0.06		100.12	
111 D4. V	51.35	18.20	14.50	n. d.	3.10	10.26	0.84	0.16	0.25				0.13		99.25	

ANDESITE—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Buhemin, Elburz Mountains, Persia.	E. Drasche.	E. Drasche, Vh. Wien. G. R-A., 1884, p. 196.	Augite-andesite.	
		Perumbakan, Madras, India.	T. H. Holland?	T. H. Holland, Q. J. G. S., LIII, p. 409, 1897.	Augite-andesite.	
SO_3 S	0.95 2.25	Bandaisan, Japan.	Shimidzu.	T. Wada, Mt. D. Ges. Ost-As., V, p. 74, 1889.	Andesite ash.	Alkalies interchanged, cf. N. J., 1890, II, p. 102.
Cl S.	0.29 3.16	Kirishimayama, Kiushiu Islands, Japan.	M. Fesca.	M. Fesca, Mt. D. Ges. Ost-As., VI, p. 347, 1896.	Andesite ash.	Incorrect in N. J., 1897, I, p. 288.
		Sulphur Island, Japan.	J. Petersen.	J. Petersen, Jb. Hamb. Wiss. Anst., VIII, p. 13, 1891.	Augite-andesite.	
		Sulphur Island, Japan.	J. Petersen.	J. Petersen, Jb. Hamb. Wiss. Anst., VIII, p. 15, 1891.	Augite-andesite.	
		Chichishima, Bonin Islands, Japan.	Fukuda.	Y. Kikuchi, J. Coll. Sci. Imp. Un. Jap., III, p. 73, 1890.	Andesite.	"Boninite" in Petersen, Jb. Hamb., W. Anst., VIII, p. 348, 1891.
		Ototoshima, Bonin Islands, Japan.	Fukuda.	Y. Kikuchi, J. Coll. Sci. Imp. Un. Jap., III, p. 73, 1890.	Andesite-perlite.	"Boninite" in Petersen, loc. cit., p. 348.
		Miyakashima, Bonin Islands, Japan.	J. Petersen.	J. Petersen, Jb. Hamb. W. Aust., VIII, p. 50, 1891.	Miyakite.	Al_2O_3 high. MgO low. MnO high.
		Eruption, August, 1883, Krakatoa.	A. Schwager.	K. Oebekke, N. J. 1884, II, p. 33.	Andesite ash.	
$CaSO_4$ Sol. salts	0.62 0.89	Eruption, August, 1883, Krakatoa.	C. Winkler.	R. D. M. Verbeek, Krakatau, Batavia, 1884, p. 292.	Andesite ash.	
$CaSO_4$ Sol. salts	1.57 1.11	Eruption, August, 1883, Krakatoa.	C. Winkler.	R. D. M. Verbeek, Krakatau, Batavia, 1884, p. 292.	Andesite ash.	
		Erupted block, December, 1876, Merapi, Java.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 467, 1887.	Andesite	
		Saleijer Island, Celebes.	A. Wichmann.	A. Wichmann, Nk. Tds. Ned. Ind., LIV, p. 261, 1895.	Andesite tuff.	
		Tanna Island, New Hebrides, Pacific Ocean.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XX, p. 236, 1887.	Lava.	NoMgO? MnO high.
		Tanna Island, New Hebrides, Pacific Ocean.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XX, p. 237, 1887.	Lava.	Al_2O_3 high? MgO low?
		New Britain, Pacific Ocean.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XVI, p. 50, 1883.	Pumice.	MgO? MnO high?
		Rotochu, Tarawera, New Zealand.	J. A. Pond.	S. P. Smith, Eruption of Tarawera, Wellington, 1887, p. 76.	Lapilli.	CaO? Alkalies?
SO_3 Cl	0.41 0.05	Pareheru, Tarawera, New Zealand.	J. A. Pond.	S. P. Smith, Eruption of Tarawera, Wellington, 1887, p. 76.	Lapilli.	CaO? Alkalies?

ANDESITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
112 D4. V	50.90	20.00	14.10	n. d.	2.77	10.38	0.70	0.14	——				0.16		99.41	
113 D4. V	55.12	20.41	7.74	n. d.	2.75	5.35	3.80	2.50	3.13						100.80	

GABBRO.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 B4. V	57.00	16.01	n. d.	10.30	1.62	6.20	4.35	3.53	0.15						99.16	
2 D4. V	49.93	24.64	n. d.	2.74	2.43	6.27	2.20	3.80	1.20			6.01			99.22	
3 D4. V	49.30	22.46	12.04	n. d.	2.14	9.30	3.01	1.27	0.78						100.30	
4 D4. V	43.35	29.75	5.61	n. d.	2.03	12.46	trace	5.93	0.73						99.86	
5 B4. V	45.35	16.11	3.42	3.50	12.32	18.04	(1.26)								100.00	2.992
6 C3. V	44.11	24.45	7.89	6.52	3.84	11.96	1.67	0.22	0.60				0.51	trace	101.27	3.044
7 A3. III	38.05	24.73	5.65	6.08	11.58	1.25	2.54	1.94	7.53	——	0.93				100.28	
8 A3. III	49.19	18.71	5.03	4.04	5.92	7.98	1.44	0.77	5.05	——	1.82				99.95	
9 D3. V	53.43	13.81	5.08	9.86	4.64	8.25	2.51	1.12	0.27					trace	98.97	
10 D4. V	50.43	23.83	17.63	n. d.	2.46	4.79	1.66	0.22	n. d.			trace			98.63	
11 D4. V	47.43	23.66	13.06	n. d.	3.15	11.21	0.15	0.20	0.90						99.76	
12 C4. V	47.40	29.74	n. d.	1.94	0.57	13.30	4.99	1.56	1.64						101.14	2.704
13 A2. II	45.69	13.30	1.85	4.72	13.06	13.50	1.36	trace	2.47	2.29	1.89		0.06	0.24	100.86	
14 A3. III	45.43	12.55	n. d.	6.50	13.41	12.39	1.71	0.11	2.74	2.41	2.35		0.04	0.21	100.09	
15 C4. V	53.46	13.35	n. d.	16.74	3.07	10.94	n. d.	n. d.	1.64		0.80				100.00	
16 D4. V	39.87	24.30	1.59	4.09	11.30	7.61	1.93	1.11	8.12						99.92	2.73

ANDESITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.22 Cl 0.04	Wairoa, Tarawera, New Zealand.	J. A. Pond.	S. P. Smith, Eruption of Tarawera, Wellington, 1887, p. 76.	Andesitic lapilli.	Al_2O_3 high. CaO? Alkalies?
	Port Hills, Christchurch, New Zealand.	R. Speight.	R. Speight, Tr. N. Z. Inst., XXV, p. 369, 1893.	Olivine-andesite.	"Most trustworthy of 4 bad analyses."

GABBRO.

	Natural Bridge, Adirondack Mountains, New York.	C. H. Smyth, jr.	C. H. Smyth, jr., B. G. S. A., VI, p. 274, 1895.	Gabbro.	
	Rosetown, west of Stony Point, New York.	L. M. Dennis.	J. F. Kemp, A. J. S., XXXVI, p. 251, 1888.	Hornblende-gabbro.	Al_2O_3 and TiO_2 high. MgO low.
	Rosetown, west of Stony Point, New York.	J. F. Kemp?	J. F. Kemp, A. J. S., XXXVI, p. 249, 1888.	Hornblende-gabbro.	Al_2O_3 high. MgO low.
	Rosetown, west of Stony Point, New York.	L. M. Dennis.	J. F. Kemp, A. J. S., XXXVI, p. 250, 1888.	Hornblende-gabbro.	Al_2O_3 high. MgO low. Alkalies?
	Gwinn's Falls, Baltimore, Maryland.	W. S. Bayley.	G. H. Williams, B. U. S. G. S., 28, p. 37, 1886.	Hypersthene-gabbro.	
	Mount Hope, Baltimore, Maryland.	L. McCay.	G. H. Williams, B. U. S. G. S., 28, p. 37, 1886.	Hypersthene-gabbro.	Different in 15 A. R. U. S. G. S., p. 673, 1895.
	Sturgeon Falls, Menominee River, Michigan.	R. B. Riggs.	G. H. Williams, B. U. S. G. S., 62, p. 76, 1890.	Gabbro.	Altered.
	Lower Quinnesec Falls, Menominee River, Michigan.	R. B. Riggs.	G. H. Williams, B. U. S. G. S., 62, p. 89, 1890.	Gabbro-diorite.	Schistose. Not fresh.
	Wind Lake, Minnesota.	Dodge and Sidener.	M. E. Wadsworth, Bull. 2, G. Nh. S. Minn., p. 97, 1887.	Gabbro.	
	Duluth, Minnesota.	J. A. Dodge.	M. E. Wadsworth, Bull. 2, G. Nh. S. Minn., p. 75, 1887.	Gabbro.	
	Granite Falls, Minnesota.	E. J. Babcock.	C. W. Hall, B. U. S. G. S., 157, p. 89, 1899.	Hypersthene-gabbro.	
	Encampment Island, Minnesota.	C. Palache.	A. C. Lawson, Bull. 8, G. Nh. S. Minn., p. 6, 1893.	Anorthosite.	
SO_3 0.43	Bagley Canyon, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 404, 1891.	Gabbro.	"Shaly." Not fresh.
SO_3 0.24 C trace	Bagley Canyon, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 404, 1891.	Gabbro.	"Shaly." Not fresh.
	St. Thomas, West Indies.	J. Siemiradzki.	J. Siemiradzki, N. J., 1886, II, p. 176.	Corsite.	
	Belhelvic, Aberdeenshire, Scotland.	A. E. Brown.	T. G. Bonney, Geol. Mag., XXII, p. 442, 1885.	Troctolite.	Not fresh. All determinations uncertain; cf. Ref. note.

GABBRO—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
17 B4. V	42.81	14.55	n. d.	20.52	1.62	3.96	5.57	2.01	6.38	0.40		1.90	0.51		100.23	
18 D4. V	43.66	26.79	5.81	n. d.	5.80	15.64	1.97	0.55	1.76				0.44		102.42	
19 D4. V	48.38	23.66	8.03	n. d.	6.58	11.02	2.60	1.09	n. d.						101.36	
20 D2. V	49.90	23.33	4.10	4.38	1.65	10.97	3.06	0.62	0.60	0.13		0.42	0.49		99.97	
21 C2. IV	49.48	20.60	4.23	3.75	4.16	13.07	2.65	0.21	0.25	0.11		0.32	0.87		99.98	
22 D3. V	47.75	22.49	4.53	3.23	0.59	15.99	0.91	1.75	0.76				0.48	1.53	100.01	
23 D4. V	47.37	14.65	13.74	n. d.	0.51	13.27	3.58	1.29	1.09					4.69	100.19	2.635
24 C4. V	46.57	19.56	n. d.	5.82	9.27	13.29	3.24	0.51	2.88						101.14	
25 D3. V	50.95	7.21	1.29	7.39	20.31	6.13	5.53	1.03	0.77						100.61 (100.66)	3.102
26 C4. V	59.52	20.18	n. d.	6.68	1.34	6.81	2.82	1.26	1.77						100.38	
27 C4. V	55.19	20.24	n. d.	8.18	4.97	8.68	1.83	0.27	0.79						100.15	
28 D4. V	40.49	16.20	22.10	n. d.	7.04	14.25	1.45	0.19	0.05						101.77	
29 B4. V	48.40	17.53	n. d.	4.28	16.51	11.11	1.80		0.76						100.91	
30 B3. IV	47.00	23.67	2.31	3.20	8.72	11.40	2.40	0.70	0.62					trace	100.02	
31 B3. V	41.55	21.40	11.38	1.35	12.20	7.80	0.80	0.24	3.65					trace	100.87	
32 D3. V	38.47	18.89	1.92	0.78	4.33	30.34	1.15	1.54	2.89						100.31	3.05
33 D2. V	50.14	15.65	1.06	10.11	5.05	8.62	2.85	1.19	0.17	0.17		2.47	0.38	0.20	98.86	
34 C3. V	42.56	21.99	4.69	5.40	6.69	17.06	1.67	0.35	0.17						100.58	
35 C3. V	38.59	24.37	7.66	5.23	5.95	15.30	1.34	0.46	0.84						99.64	
36 D3. V	37.82	19.94	3.48	12.70	10.97	14.71	1.68	n. d.	0.57						101.82	

GABBRO—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Cataclews Point, Cornwall.	J. J. Beringer.	H. Fox, Tr. R. G. Soc. Cornw., XII, p. 71, 1896.	Biotite-plagioclase rock.	Not fresh.
	Dramont, Esterel, France.	Rüst.	A. Michel Lévy, B. Serv. Cte. G. Fr., No. 57, p. 36, 1897.	Inclusion in esterellite.	
	Kullen, Sweden.	A. Hennig.	A. Hennig, cf. N. J., 1900, I, p. 224.	Gabbro.	
FeS_2 0.32	Fuchstein, Oberkaimsbach, Hesse Darmstadt.	W. Sonne.	C. Chelius, Nb. Ver. Erdk, XVIII, p. 24, 1897.	Olivine-gabbro.	
FeS_2 0.28	Vierstock, Kaimsbach, Hesse Darmstadt.	Not stated.	C. Chelius, Erl. G. Kte. Hesse., V, p. 20, 1897.	Olivine-gabbro.	
	Frankenstein, Hesse Darmstadt.	F. W. Schmidt.	Chelius and Klemm, Erl. G. Kte. Hesse., IV, p. 39, 1896.	Olivine-gabbro.	
	Eichberg, Hesse Darmstadt.	F. W. Schmidt.	C. Chelius, Erl. G. Kte. Hesse., I, p. 18, 1886.	Gabbro.	MnO high.
	Rosswein, Saxony.	Sachsse and Becker.	Sachsse and Becker, cf. N. J., 1893, II, p. 503.	Gabbro.	
	Studené Eule, Bohemia.	V. Stanek.	E. Radl, cf. N. J., 1899, II, p. 58.	Gabbro.	Al_2O_3 low. MgO high. Na_2O high?
	Mount Pilis, Zemplen Comität, Hungary.	Petrik.	J. v. Szadeczky, F. K., XXI, p. 268, 1891.	Labradorite.	
	Mount Pilis, Zemplen Comität, Hungary.	Petrik.	J. v. Szadeczky. F. K., XXI, p. 272, 1891.	Augitic labradorite.	
	Jablanica, Herzegowina.	C. v. John?	C. v. John, Jb. Wien, G. R-A., XXXVIII, p. 352, 1888.	Gabbro.	
FeS_2 0.52	Mount Collon, Arolla, Switzerland.	A. Brunet.	A. Brun, cf. N. J., 1897, I, p. 475.	Gabbro.	
	Mt. Collon, Arolla, Switzerland.	A. Brunet.	A. Brun, cf. N. J., 1897, I, p. 475.	Gabbro.	
F trace FeS_2 0.50	Mt. Collon, Arolla, Switzerland.	A. Brunet.	A. Brun., cf. N. J., 1897, I, p. 475.	Gabbro.	
Cl 0.08 S 0.31 X 0.41	Stazzona, Orezza, Corsica.	M. Oels.	M. Oels, cf. N. J., 1896, I, p. 46.	Gabbro.	
	Goroschki, Wolhynia, Russia.	W. Tarassenko.	W. Tarassenko, cf. N. J., 1899, I, p. 463.	Olivine-gabbro-norite.	
	Supreya, N. Ural Mountains, Russia.	Loewinson-Lessing.	Loewinson-Lessing, G. Sk. Jushno. Dorpat, 1900, p. 166.	Magnetite-gabbro.	Light bands Al_2O_3 high.
	Deneshkin Kamen, N. Ural Mountains, Russia.	Loewinson-Lessing.	Loewinson-Lessing, G. Sk. Jushno. Dorpat, 1900, p. 166.	Magnetite-microgabbro-diorite.	Al_2O_3 high.
	Supreya, N. Ural Mountains, Russia.	Loewinson-Lessing.	Loewinson-Lessing, G. Sk. Jushno. Dorpat, 1900, p. 166.	Magnetite-gabbro.	Dark bands.

GABBRO—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O--	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
37 A3. III	45.97	18.18	5.95	2.30	7.50	8.29	4.10	0.75	6.50					trace	99.54	2.870 15°
38 A3. III	39.30	18.58	8.88	1.61	4.09	16.82	6.01	0.42	4.72		0.13		trace	trace	100.56	3.122 15°
39 A3. III	39.12	2.44	5.68	1.70	37.08	0.30	1.29	0.42	11.70						99.73	2.649 15°

NORITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O--	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 D3. V	40.61	25.90	2.18	5.37	7.69	14.50	2.31	0.25	0.78			0.65			100.24	2.91
2 D3. V	64.04	2.11	2.81	22.14	4.04	0.60	0.30	0.11	0.67	3.73					100.55	
3 D3. V	58.94	2.72	3.01	22.94	4.74	0.71	0.24	0.09	3.35		3.72				100.46	
4 D4. V	65.17	21.04	0.74	n. d.	0.04	1.20	9.20	1.70	0.80			trace			99.89	
5 A4. IV	51.80	26.42	11.08	n. d.	5.08	1.45	3.13	0.24	0.84						100.04	
6 B3. IV	51.30	25.20	2.91	2.39	4.01	2.50	3.82	0.79	0.55						99.47	2.88
7 C4. V	49.38	28.03	12.32	n. d.	3.50	2.73	3.49	0.93	0.64						101.02	2.92
8 D2. V	52.28	23.30	4.13	3.25	3.02	5.01	3.95	1.51	n. d.			1.80	0.80		100.22	
9 B4. V	52.21	19.24	10.46	n. d.	2.36	7.28	3.48	1.09	n. d.			3.12	1.21		100.45	
10 B4. V	49.89	24.39	6.09	n. d.	3.91	9.61	5.30	0.29				1.22			100.70	
11 D4. V	50.45	6.50	2.49	8.38	19.02	7.82	n. d.	n. d.	0.97			0.63	trace	trace	96.26	
12 D3. V	35.81	14.32	7.38	15.25	10.49	17.23	2.06	0.37	5.25			2.30		0.18	100.62	3.08

GABBRO—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Laurium, Attika, Greece.	R. Lepsius.	R. Lepsius, Geol. v. Attika, Berlin, 1893, p. 102.	Hornblende-gabbro.	Not fresh.
		Plaka, n. Laurium, Greece.	R. Lepsius.	R. Lepsius, Geol. v. Attika, Berlin, 1893, p. 97.	Gabbro.	Not fresh.
		Kaisariani, Mount Hymettos, Greece.	R. Lepsius.	R. Lepsius, Geol. v. Attika, Berlin, 1893, p. 99.	Olivine-gabbro.	Not fresh. Serpentinized.

NORITE.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXVI, p. 340, 1900.	Olivine-norite.	Al_2O_3 high.
		Muscovado Lake, Cook County, Minnesota.	A. D. Meeds.	N. H. Winchell, 23 A. R. G., Nh. S. Minn., p. 212, 1895.	Norite.	Igneous? Not fresh? Same as next.
		Muscovado Lake, Cook County, Minnesota.	A. D. Meeds.	N. H. Winchell, 23 A. R. G., Nh. S. Minn., p. 212, 1895.	Norite.	Igneous? Not fresh. Same as above.
		San Diego, California.	Not stated.	L. V. Chrustchoff, cf. N. J., 1886, II, p. 57.	Hyperite.	Al_2O_3 high. FeO and MgO low.
		Le Pallet, Loire Infér., France.	Not stated.	A. Lacroix, B. Serv. Cte. G. Fr., LXVII, p. 23, 1899.	(Cordierite?) Norite.	Contact metamorphism.
		Prinaux, France.	A. Lacroix.	A. Lacroix, B. Serv. Cte. G. Fr., LXVII, p. 23, 1899.	Cordierite-norite.	Contact metamorphism.
		Le Pallet, Loire Infér., France.	Not stated.	A. Lacroix, B. Serv. Cte. G. Fr., LXVII, p. 23, 1899.	Garnet-norite.	Contact metamorphism.
ZrO_2	0.07	Theingsvaag, Soggendal, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 142.	Quartz-norite.	Al_2O_3 high. MgO low.
		Rekefjord, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 79.	Quartz-norite.	
		Birkrem, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 96.	Norite.	Facies of granite.
		Sone River, S. Rewa, India.	P. Brühl.	T. H. Holland, Rec. G. S. Ind., XXX, p. 20, 1897.	Olivine-norite.	Alkalies not determined.
BaO SrO	none none	Duluth, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 284, 1900.	Troctolite.	Al_2O_3 or CaO high?

DIABASE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 B2. III	41.15	13.51	2.32	8.63	10.09	8.75	3.21	1.22	3.05		5.54	1.60	0.61	1.28	100.96	
2 B2. III	39.32	14.48	2.01	8.73	11.11	8.30	3.76	0.87	2.57		5.25	1.70	0.61	0.71	99.42	
3 B4. V	44.44	23.19	12.70	n. d.	2.82	6.03	3.93	1.75	3.73				0.70	0.52	99.81	
4 B4. V	50.89	15.39	5.77	n. d.	7.60	8.75	5.67	2.72	2.46						99.25	
5 D4. V	44.51	19.99	7.22	n. d.	8.11	8.15	5.24	2.60	2.93						98.75	
6 C4. V	45.46	19.94	15.36	n. d.	2.95	8.32	2.12	3.21	2.30						99.66	
7 B3. IV	43.41	19.42	5.72	6.69	5.98	9.11	4.39	0.47	3.00		2.00	0.35			100.54	
8 B4. V	44.86	17.24	11.12	n. d.	4.98	7.53	1.50	2.81	2.44		in H_2O	6.66	0.41	trace	99.55	
9 C4. V	51.46	13.98	2.66	8.92	7.59	10.49	4.75		n. d.			1.06	0.17		101.08	
10 B4. V	50.81	13.25	14.66	n. d.	6.97	10.96	0.76	1.71	0.88						100.00	
11 B4. V	50.61	18.34	n. d.	13.91	6.73	7.01	1.60	1.08	1.72						100.00	
12 A4. IV	52.06	13.67	15.97	n. d.	5.01	8.15	3.36	0.86	1.05						100.13	2.953
13 D4. V	51.08	23.58	6.85	n. d.	4.95	9.36	2.34		n. d.					0.39	100.00	
14 A4. IV	47.87	14.43	11.55	n. d.	10.58	10.45	3.47	0.61	1.82						100.78	
15 A4. IV	45.73	13.48	11.60	n. d.	15.40	9.92	3.24	0.47	0.94						100.78	3.026
16 D4. V	42.07	32.05	9.83	n. d.	1.38	0.95	1.11		12.13					0.48	100.00	
17 B4. V	37.09	13.19	35.69	n. d.	0.57	0.41	1.75	0.33	11.83						100.86	
18 A1. I	43.62	17.30	14.13	6.83	2.34	1.63	3.45	3.03	2.93	0.30		2.75	1.34	trace	99.74	
19 A4. IV	39.55	28.76	16.80	n. d.	0.59	0.37	trace	trace	13.26			0.64	0.10	trace	100.07	

DIABASE.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Auburn, Maine.	Packard.	G. P. Merrill, A. G., X, p. 54, 1892.	Diabase.	Not fresh.
	Lewiston, Maine.	Packard.	G. P. Merrill, A. G., X, p. 54, 1892.	Diabase.	Not fresh.
	Medford, Massachusetts.	G. P. Merrill?	G. P. Merrill, B. G. S. A., VII, p. 353, 1896.	Diabase.	Not fresh. Cf. No. 5, andose.
	Indian Point, Upper Chateaugay Lake, New York.	A. S. Eakle.	A. S. Eakle, A. G., XII, p. 35, 1893.	Diabase.	
	Upper Chateaugay Lake, Clinton County, New York.	A. S. Eakle.	A. S. Eakle, A. G., XII, p. 35, 1893.	Diabase.	
	Palmer Hill, Essex County, New York.	J. F. Kemp.	Kemp and Marsters, B. U. S. G. S., 107, p. 26, 1893.	Diabase.	
	Keene Valley, Adirondack Mountains, New York.	A. R. Leeds.	Leeds and Julien, 30 A. R. N. Y. Surv., p. 102, 1867.	Diabase.	Cf. Kemp and Marsters. B.U.S.G.S.,107, p. 26, 1893.
	Fort Montgomery, Hudson River, New York.	L. M. Dennis.	J. F. Kemp, Am. Nat., 1888, p. 694.	Hornblende-diabase.	TiO_2 high.
	Rocky Hill, New Jersey.	A. H. Phillips.	A. H. Phillips, A. J. S., VIII, p. 279, 1899.	Diabase.	
	Little Falls, Passaic County, New Jersey.	W. C. Day.	W. C. Day, 20 A. R. U. S. G. S., VI, p. 419, 1899.	Diabase.	Calc. to 100%?
	Mine Brook, Somerset County, New Jersey.	T. B. Stillman.	W. C. Day, 20 A. R. U. S. G. S., VI, p. 419, 1899.	Diabase.	Calc. to 100%?
	Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson, A. G., XXII, p. 87, 1898.	Quartz-diabase.	
	Chatham, Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson, A. G., XXIV, p. 360, 1899.	Diabase.	Al_2O_3 high, Fe_2O_3 low.
	Chatham, Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson A. G., XXII, p. 87, 1898.	Olivine-diabase.	Not fresh.
	Chatham, Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson. A. G., XXII, p. 87, 1898.	Olivine-diabase.	
	Chatham, Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson, A. G., XXIV, p. 360, 1899.	Diabase.	Not fresh.
	Chatham, Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson, A. G., XXII, p. 87, 1898.	Olivine-diabase.	Not fresh.
Cr_2O_3 none NiO none BaO 0.09 SrO trace Li_2O trace	Near Boone, Watauga County, North Carolina.	H. N. Stokes.	A. Keith, B. U. S. G. S., 168, p. 53, 1900.	Metamorphosed amygdaloid.	
Cr_2O_3 trace	Wadesboro, North Carolina.	T. M. Chatard.	I. C. Russell, B. U. S. G. S., 52, p. 18, 1889.	Diabase.	Not fresh.

DIABASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
20 B4. V	49.90	16.32	n. d.	13.54	6.22	6.58	1.82	2.25	0.76			1.47	0.17	trace	99.03	3.026
21 D4. V	48.08	23.67	9.07	n. d.	3.92	10.99	1.92	0.49	0.83				1.11		100.08	3.030
22 D4. V	47.50	22.44	7.40	n. d.	3.71	10.21	1.62	1.29	2.85				0.34		97.36	2.927
23 D4. V	47.84	25.40	6.72	n. d.	5.25	8.44	2.55	0.60	2.53				0.94		100.27	3.080
24 D4. V	47.83	30.28	4.57	n. d.	4.32	6.72	1.30	trace	2.05				2.19		99.26	3.028
25 A1. I	46.85	22.62	5.12	1.58	2.01	1.25	0.80	2.66	8.25	3.12	1.89	1.12	0.16	2.54	100.15	
26 B2. III	41.60	37.20	3.21	0.30	0.02	0.23	0.07	—	13.54	0.29	0.38	3.79	0.14	0.08	100.85	
27 A1. I	54.66	15.85	1.82	5.12	5.64	8.75	3.46	0.47	2.48	0.25	0.39	0.67	0.15	0.18	100.02	
28 A1. I	45.74	5.29	0.13	2.06	0.94	23.85	0.11	1.29	1.07	0.22	18.91	0.36	0.07	0.26	100.79	
29 B4. V	46.28	12.96	4.67	6.06	8.71	10.12	3.75		3.34			3.54		trace	99.43	2.921
30 D4. V	45.59	20.99	2.49	4.36	8.95	7.57	4.89		5.06						99.90	2.707
31 D4. V	44.71	15.54	3.06	6.43	6.80	10.50	2.55		5.90			2.88		trace	98.37	2.858
32 B2. III	46.98	14.94	5.01	4.88	6.86	5.40	3.52	1.10	4.48		5.39	0.42	0.49		99.47	2.703
33 D2. V	54.21	21.32	2.35	4.45	4.77	8.99	1.79	0.74	none	—	0.04	1.49	0.01	0.21	100.37	3.010
34 D4. V	51.19	24.52	1.46	4.67	5.33	9.58	2.09	0.60	0.30	—	none	0.40	0.01	trace	100.15	2.968
35 A2. II	49.80	13.93	2.24	8.07	8.85	7.96	2.02	0.19	2.20	—	4.87	0.08	trace	trace	100.21	
36 D4. V	53.55	15.54	15.79	n. d.	5.79	6.71	1.41	1.96	1.83						102.58	3.02
37 C4. V	51.85	13.50	16.43	n. d.	5.49	8.80	3.10	0.91	0.93						101.01	
38 A4. IV	53.70	18.21	10.64	n. d.	5.24	6.66	2.65	0.99	1.55						99.64	

DIABASE—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Blezard Mine, Sudbury, Ontario.	T. L. Walker?	T. L. Walker, Q. J. G. S., LIII, p. 56, 1897.	Diabase.	
		Whitefish Bay, Rainy Lake, Canada.	F. T. Shutt.	A. C. Lawson, A. G., VII, p. 161, 1891.	Diabase.	Al_2O_3 high. 30 feet from contact.
		Whitefish Bay, Rainy Lake, Canada.	F. T. Shutt.	A. C. Lawson, A. G., VII, p. 161, 1891.	Diabase.	Sum low. Al_2O_3 high. At contact.
		Stop Island, Rainy Lake, Canada.	F. T. Shutt.	A. C. Lawson, A. G., VII, p. 158, 1891.	Diabase.	Al_2O_3 high. 4 feet from contact.
		Stop Island, Rainy Lake, Canada.	F. T. Shutt.	A. C. Lawson, A. G., VII, p. 158, 1891.	Diabase.	Al_2O_3 high. At contact.
NiO BaO	0.08 0.10	Section 13, T. 47 N., R. 46 W., Penokee Gogebic Region, Michigan.	T. M. Chatard.	C. H. Van Hise, M. U. S. G. S., XIX, p. 357, 1892.	Diabase.	Altered. Cf. No. 18 auvergnose.
BaO	trace	Aurora Mine, Penokee Gogebic Region, Michigan.	T. M. Chatard.	C. H. Van Hise, M. U. S. G. S., XIX, p. 357, 1892.	Diabase.	Altered.
FeS_2 NiO BaO SrO Li_2O	0.09 trace? 0.04 trace none	Butte County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 473, 1894.	Diabase-tuff.	
FeS_2 BaO SrO Li_2O	0.49 trace none trace	North Station Mine, Nevada County, California.	W. F. Hillebrand.	W. Lindgren, 17 A. R. U. S. G. S., II, p. 149, 1896.	Diabase.	Altered wall rock.
		Point Bonita, Marin County, California.	F. L. Ransome.	F. L. Ransome, B. Dep. G. Un. Cal., I, p. 106, 1893.	Diabase.	K_2O calc. as Na_2O.
		Point Bonita, Marin County, California.	F. L. Ransome.	F. L. Ransome, B. Dep. G. Un. Cal., I, p. 106, 1893.	Diabase.	K_2O calc. as Na_2O.
		Point Bonita, Marin County, California.	F. L. Ransome.	F. L. Ransome, B. Dep. G. Un. Cal., I, p. 106, 1893.	Diabase.	K_2O calc. as Na_2O. Sum low.
		Miahuatlan, Oaxaca, Mexico.	A. Röhrig.	H. Lenk, in Felix and Lenk, Btr. G. Mex., II, p. 123, 1899.	Olivine-diabase.	Not fresh.
S	trace	Average sample, Demerara River, British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, Rep. G. Ess. River, p. 64, 1900.	Diabase.	Al_2O_3 high. Dried at 110°.
S	trace	Average sample, Potaro River, British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, Rep. G. Ess. River, p. 64, 1900.	Diabase.	Al_2O_3 high. Dried at 110°.
S	none	Caman's, Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Distr., II, p. 12, 1898.	Diabase.	Not fresh.
		Hapucú, Sao Paolo, Brazil.	Not stated.	F. de P. Oliveira, cf. N. J., 1891, II, p. 304.	Diabase.	Sum high.
		Bufao, Sao Paolo, Brazil.	Not stated.	F. de P. Oliveira, cf. N. J. 1891, II, p. 304.	Diabase.	
		High Green, Bellingham, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 240, 1884.	Diabase.	

DIABASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
39 A4. IV	51.20	20.03	7.57	n. d.	6.75	10.52	1.71	0.51	1.70						99.99	2.885
40 B4. V	36.80	22.95	n. d.	4.08	2.85	9.73	0.50	1.10	7.70		11.90	2.60	0.75	trace	100.96	
41 D4. V	51.20	17.34	12.43	n. d.	4.71	6.35	3.28	1.92	2.77			1.08	1.27		102.35	
42 B4. V	52.81	19.83	11.89	n. d.	5.32	0.95	3.54	2.71	3.10						100.15	
43 C3. V	52.91	21.77	3.47	4.30	2.19	6.82	4.93	2.51	0.91						99.32	
44 A4. IV	52.69	18.93	10.99	n. d.	2.56	5.31	4.04	2.11	2.76			0.60	0.80		100.79	
45 A4. IV	50.95	17.50	14.42	n. d.	2.63	6.85	3.38	1.65	2.02			0.50	0.78		100.68	
46 A4. IV	50.65	18.45	13.80	n. d.	2.68	6.22	3.71	1.92	2.02			0.50	0.78		100.73	
47 A4. IV	49.20	19.13	13.60	n. d.	3.08	7.18	3.63	1.89	1.31			0.56	0.75		100.33	
48 A4. IV	47.97	11.26	9.09	5.46	3.95	11.76	5.14		2.54			1.68			99.72	
49 D2. V	46.54	16.88	3.20	7.41	9.77	9.54	3.14	0.63	0.69			0.96	trace		98.76	
50 D3. V	49.36	18.52	3.91	10.13	3.37	7.55	3.45	1.89	0.80						98.98	
51 D3. V	49.17	14.59	3.91	12.94	4.32	8.78	3.68	0.79	0.58						98.76	
52 B3. IV	46.50	13.54	12.39	7.04	6.30	9.60	2.09	1.83	——						99.29	
53 B3. IV	46.38	12.86	12.08	8.04	6.22	10.55	2.13	1.80	——						100.63	
54 B3. IV	46.32	12.81	13.06	7.93	6.97	9.03	2.13	1.74	——						99.99	
55 B3. IV	45.75	12.41	13.23	8.23	5.07	11.41	2.18	1.71	——						99.94	
56 B3. IV	45.68	11.96	12.78	8.77	5.60	11.21	2.11	1.88	——						99.99	
57 B3. IV	43.74	11.99	17.64	12.20	4.39	7.61	2.19	1.80	——						100.56	
58 D2. V	52.40	19.47	4.15	3.80	2.26	8.60	4.45	1.11	2.77			0.19	1.98		101.61	

DIABASE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Morpeth, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 239, 1884.	Diabase.	
	Newhalls, Queensferry, Scotland.	E. Stecher.	E. Stecher, T. M. P. M., IX, p. 190, 1898.	White trap.	Not fresh.
	Pelvoux, France.	P. Termier.	P. Termier, C. R., CXXIV, p. 635, 1897.	Diabase.	Sum high.
	Pelvoux, France.	P. Termier.	P. Termier, C. R., CXXIV, p. 635, 1897.	Diabase.	Not fresh.
	Holmestrand, Kristiania Fjord, Norway.	G. Särnström.	W. C. Brögger, Z. K., XVI, p. 28, 1890.	Diabase-porphyrite.	Al_2O_3 high.
	Kullen, Sweden.	L. G. Thomé.	A. Hennig, cf. N. J. 1901, II, p. 59.	Kullaite.	
	Mölle, Kullen, Sweden.	L. G. Thomé.	A. Hennig, cf. N. J. 1901, II, p. 59.	Konga diabase.	
	Bökebolet, Kullen, Sweden.	L. G. Thomé.	A. Hennig, cf. N. J. 1901, II, p. 59.	Konga diabase.	
	Tånga, Kullen, Sweden.	L. G. Thomé.	A. Hennig, cf. N. J. 1901, II, p. 59.	Olivine-diabase.	
	Ottfjall, Sweden.	P. J. Holmquist.	P. J. Holmquist, G. F. F., XVI, p. 190, 1894.	Diabase.	
	Krustorp, Brefven, Sweden.	K. Winge.	K. Winge, G. F. F., VXIII, p. 195, 1896.	Olivine diabase.	
	Föglö, Aland, Finland.	H. Berghell.	B. Frosterus, Finl. G. Und., Bl. 25, p. 23, 1894.	Diabase.	
	Föglö, Aland, Finland.	H. Berghell.	B. Frosterus, G. F. F., XV, p. 285, 1893.	Diabase.	
	Sundholm, Nystad, Finland.	Not stated.	H. Gylling, Finl. G. Und., Bl. 12, p. 55, 1888.	Diabase.	Ignited before analysis.
	Padoi, Letala, Finland.	Not stated.	H. Gylling, Finl. G. Und., Bl. 12, p. 55, 1888.	Diabase.	Ignited before analysis.
	Leinmäki, Letala, Finland.	Not stated.	H. Gylling, Finl. G. Und., Bl. 12, p. 55, 1888.	Diabase.	Ignited before analysis.
	Rautavuori, Letala, Finland.	Not stated.	H. Gylling, Finl. G. Und., Bl. 12, p. 56, 1888.	Diabase.	Ignited before analysis.
	Heuru, Honkilahti, Finland.	Not stated.	H. Gylling, Finl. G. Und., Bl. 12, p. 56, 1888.	Diabase.	Ignited before analysis.
	Kivijärvi, Eura, Finland.	Not stated.	H. Gylling, Finl. G. Und., Bl. 12, p. 56, 1888.	Diabase.	Ignited before analysis. Not fresh.
SO_3 0.43	Balkhausen, Hesse Darmstadt	R. Marzahn.	Chelius and Klemm, Erl. G. Kte. Hesse, IV, p. 37, 1896.	Diabase.	P_2O_5 high.

DIABASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
59 A3. III	61.03	21.41	4.81	1.47	0.56	2.54	4.44	2.20	1.04			0.16			99.99	
60 A3. III	44.28	18.72	4.01	10.24	7.64	7.55	3.49	0.74	1.75		0.67	0.93			100.43	
61 A3. III	48.40	15.33	2.66	11.04	7.06	4.61	1.89	1.39	3.25		4.94				100.57	
62 C3. V	47.89	12.07	5.73	11.08	6.56	4.94	2.14	1.37	2.99		6.53				101.30	
63 C2. IV	45.83	15.43	3.04	7.96	6.19	5.92	2.32	2.19	3.67		3.95	1.61	0.29		99.10	2.756
64 A2. II	45.81	14.92	1.99	6.52	7.62	9.32	4.54	0.31	4.11		3.88	0.70	0.11		99.89	2.814
65 A2. II	49.03	12.63	3.68	10.94	1.64	7.76	2.33	2.40	3.42		3.45	2.06	0.54		100.39	2.82
66 A2. II	44.70	14.12	0.97	8.85	6.07	10.20	2.34	0.14	4.79		5.50	1.71	0.15		99.86	2.84
67 A4. IV	55.95	19.47	4.09	1.08	4.24	7.84	2.64		3.78			1.60			100.69	2.806
68 C2. IV	50.03	15.46	4.25	6.19	7.73	8.25	2.82	1.48	4.28		in H_2O		0.29	0.53	101.31	
69 A3. III	46.95	17.40	6.11	3.99	5.34	7.25	4.26	1.18	5.00			2.33			99.81	
70 D3. V	45.98	19.93	8.62	6.04	5.46	6.29	3.41	1.29	2.40						99.42	
71 A4. IV	44.45	14.02	14.24	n. d.	9.45	6.54	6.72	0.83	4.14		0.45		0.32		101.16	2.63
72 A3. III	49.62	13.47	4.72	10.21	9.18	6.22	1.03	0.43	5.02				0.16	0.51	100.57	2.723 15°
73 D3. V	48.15	20.28	1.31	10.01	6.34	0.71	5.30	1.35	6.34						99.79	2.72
74 D4. V	49.92	14.84	11.93	n. d.	3.84	10.50	5.72		3.25						100.00	
75 C4. V	49.71	17.45	6.56	n. d.	7.01	10.76	3.74	3.24	1.82						101.29	
76 A4. IV	49.19	16.83	1.96	8.15	7.50	12.38	3.24	n. d.	1.41						100.66	
77 A4. IV	45.78	21.23	9.57	n. d.	5.81	8.06	3.57	2.71	3.45						100.18	
78 . IV	48.31	18.51	14.53	n. d.	4.45	5.40	3.42	1.82	3.88						100.32	

DIABASE—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
S	0.33	Ruppertshain, Taunus Mountains, Rh. Prussia.	L. Milch.	L. Milch, Z. D. G. G., XLI, p. 432, 1889.	Diabase.	Much altered.
S	0.41	Rauenthal, Taunus Mountains, Rh. Prussia.	L. Milch.	L. Milch, Z. D. G. G., XLI, p. 430, 1889.	Diabase.	Pressed zone.
		Near Ronneburg, Thuringia.	C. A. Müller.	C. A. Müller, Inaug. Diss. Gera, 1884, p. 32.	Diabase.	Not fresh.
		Near Ronneburg, Thuringia.	C. A. Müller.	C. A. Müller, Inaug. Diss. Gera, 1884, p. 31.	Diabase.	Not fresh.
SO_3 Org.	0.15 0.55	Thalexweiler, Blatt Lebach, Prussia.	Not stated.	Weiss and Grebe, Erl. G. Kte. Pr. Bl. Lebach, p. 38, 1889.	Diabase.	Not fresh.
S	0.06	Blatt Allendorf, Prussia.	Not stated.	F. Beyschlag, Erl. G. Kte. Pr. Bl. Allendorf, p. 11, 1886.	Diabase.	Not fresh.
SO_3	0.51	Garkenholz, Rübeland, Harz Mountains.	K. Böttcher.	K. A. Lossen, Z. D. G. G., XL, p. 204, 1888.	Hysterobase.	Not fresh. Also in Sb. Pr. G. L-A. X, p. 293, 1892.
SO_3 Org.	0.24 0.08	Wendefurt, n. St. Wendel, Harz Mountains.	K. Gremse.	K. A. Lossen, Jb. Pr. G. L-A., X, p. 266, 1892.	Leucophyr.	Not fresh.
		Zahbelic, Prague, Bohemia.	J. Nevole.	B. Macha, cf. N. J., 1901, I, p. 60.	Diabase (spessartite-like).	Not fresh.
		Podbaka, Moldauthal, Bohemia.	Strnad.	J. Klvana, cf. N. J., 1898, I, p. 485.	Olivine-diabase.	Not fresh.
		Radotin, Bohemia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. Wien. G. R-A., XXXIII, p. 350, 1899.	Diabase.	Not fresh.
		Galleno, Adamello, Tyrol.	C. Riva.	C. Riva, cf. N. J., 1887, II, p. 65.	Diabase.	Al_2O_3 high.
		Nozza, Val Sabbia, Piedmont.	C. Riva.	C. Riva, Rend. Inst. Lomb., XXVI, p. 433, 1893.	Olivine-diabase.	Not fresh.
		Rossena, Reggio Emilia, Italy.	L. Ricciardi.	L. Ricciardi, separate from ?	Diabase.	Not fresh.
		Ajaccio, Corsica.	M. Oels.	M. Oels, cf. N. J., 1896, I, p. 47.	Diabase.	Not fresh. Al_2O_3 high. CaO low?
		Jalguba, Gov. Olonez, Russia.	Loewinson-Lessing.	Loewinson-Lessing, T. M. P. M., VI, p. 294, 1885.	Diabase-aphanite.	
		Sejovica, Sofia, Bulgaria.	L. Dimitrov.	L. Dimitrov, Ds. Wien. Ak., LX, p. 514, 1893.	Epidiabase.	
		Assa, Caucasus.	Loewinson-Lessing and Krikmeyer.	Loewinson-Lessing, cf. N. J., 1899, II, p. 234.	Diabase.	
		Kolotanis, Caucasus.	Makerow.	Loewinson-Lessing, cf. N. J., 1899, II, p. 234.	Diabase.	
		Maschur Spring, Firuskuh, Persia.	C. v. John.	C. v. John, Jb. Wien. G. R-A., XXXIV, p. 121, 1884.	Diabase.	

DIABASE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O—	H_2O	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
79 C4. V	47.51	16.00	16.26	n. d.	7.38	7.63	2.29	1.01	3.25	——					101.33	
80 B2. III	43.44	16.49	4.54	9.02	4.02	10.50	3.68	3.56	2.06			0.87		0.16	99.34	
81 A3. III	53.02	16.53	1.92	7.51	2.63	0.51	4.45	2.40	1.81				0.59	0.29	99.95	
82 B3. IV	49.78	14.49	0.81	7.46	9.53	13.44	1.71	0.68	1.43				0.05		99.38	
83 A4. IV	48.55	14.38	n. d.	10.73	11.69	12.65	1.42	0.29	0.46					0.11	100.28	
84 C4. V	50.22	19.41	8.15	n. d.	7.14	10.20	3.84	1.20	1.10						101.26	
85 D3. V	49.35	27.09	6.22	5.49	2.45	3.65	1.02	1.34	2.88					0.22	99.72	
86 A3. III	47.25	17.84	5.46	7.20	5.97	5.15	2.30	0.29	8.55					0.14	100.15	2.823
87 D3. V	56.63	11.24	12.66	5.20	3.15	6.38	3.97	1.24	2.08						102.55	
88 D3. V	53.04	12.45	9.60	3.35	6.07	10.23	5.36	0.25	2.27						102.62	
89 A4. IV	52.44	12.16	13.79	n. d.	7.40	10.46	1.90	0.49	1.89						100.53	
90 D4. V	49.50	18.40	13.10	n. d.	5.25	2.24	4.65	1.48	5.23						99.95	
91 D4. V	46.60	16.90	11.60	n. d.	9.35	2.76	4.67	0.63	7.12						99.74	

MELAPHYRE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O—	H_2O	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A1.	49.24	14.79	1.36	8.00	6.89	10.74	2.76	0.88	2.97	0.20	0.90	0.96	0.17	0.18	100.08	
2 A4. IV	50.17	18.03	12.96	n. d.	6.12	8.86	3.00	0.81	1.02						100.97	
3 D4. V	49.58	19.16	14.61	n. d.	3.94	9.10	1.08		2.87						100.34	2.981
4 B4. V	45.75	13.40	8.21	6.35	7.29	12.05	1.33		1.75			2.95		0.25	99.32	
5 A2. II	52.49	15.91	8.01	0.55	5.01	5.69	3.09	2.66	4.46		0.01	0.99	0.37		100.30	2.622
6 A2. II	48.27	17.13	1.85	4.89	3.06	9.77	3.06	2.42	1.59		6.90	0.99	0.19		100.21	2.733

DIABASE—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Buhemin, Elburz Mountains, Persia.	E. Drasche.	E. Drasche, Vh. Wien. G. R-A., 1884, p. 196.	Olivine-diabase.	Dried at 120°.
		Matotschin Scharr, Nova Zembla.	A. Wichmann.	A. Wichmann, Z. D. G. G., XXXVIII, p. 527, 1886.	Diabase.	Not fresh.
$CaCO_3$	8.29	Konyam Bay, Siberia.	Lindström,	Lindström, cf. N. J., 1885, I, p. 430.	Diabase-aphanite.	Not fresh.
		Hammong Ommang, Siberia?	Lindström,	Lindström, cf. N. J., 1885, I, p. 430.	Olivine-diabase.	
CoO	trace	Dickson's Harbor, Siberia.	Lindström,	Lindström, cf. N. J., 1885, I, p. 430.	Olivine-diabase.	
		Hinazuru Pass, Kai Province, Japan.	B. Koto.	B. Koto, Q. J. G. S., XL, p. 456, 1884.	Diabase.	
		Kuroda, Kozuke, Japan.	T. Harada.	T. Harada, Die Jap. Inseln, Berlin, 1890, p. 66.	Schalstein.	From diabase. Al_2O_3 high.
		Nogurizawa, Kozuke, Japan.	T. Harada.	T. Harada, Die Jap. Inseln, Berlin, 1890, p. 66.	Schalstein.	From diabase.
		Powder Tower, Colesburg, Cape Colony.	Trechmann and Ambühl.	E. Cohen, N. J. B. B., V, p. 237, 1887.	Quartz-diabase.	Sum high.
		Richmond, Cape Colony.	Reincke and Reuling.	E. Cohen, N. J. B. B., V, p. 247, 1887.	Diabase-porphyrite.	Sum high.
		Pietermaritzburg, Natal.	G. Bauzel.	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine-diabase.	
		Kimberley, Griqualand, South Africa.	Not stated.	L. de Launay, C. R., CXXV, p. 336, 1897.	Olivine-diabase.	Al_2O_3 high. CaO low. Not fresh.
		Kimberley, Griqualand, South Africa.	Not stated.	L. de Launay, C. R., CXXV, p. 336, 1897.	Olivine-diabase.	Al_2O_3 high. CaO low. Not fresh.

MELAPHYRE.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
BaO SrO Li_2O	0.04 trace trace	Jackson, Amador County, California.	W. F. Hillebrand.	H. W. Turner, 14 A. R. U. S. G. S., II, p. 473, 1894.	Melaphyre tuff.	
		Saltinho do Pary, São Paulo, Brazil.	Not stated.	F de P. Oliveira, cf. N. J., 1891, II, p. 304.	Melaphyre.	
		Agua Clara, Puente de Chimbo, Ecuador.	J. Siemiradzki.	J. Siemiradzki, N. J. B. B., IV, p. 200, 1886.	Melaphyre.	
		Holmestrand, Kristiania Fjord, Norway.	G. Särnström.	W. C. Brögger, Z. K., XVI, p. 27, 1890.	Melaphyre.	
SO_3 Org	0.08 0.98	Sötern, Nahethal, Rh. Prussia.	Bärwald.	K. A. Lossen, Jb. Pr. G., L-A., X, p. 309, 1892.	Olivine-melaphyre.	Not fresh.
SO_3	0.09	Near Osterbrucken, St. Wendel, Harz Mountains.	Fischer.	K. A. Lossen, Jb. Pr. G., L-A., X, p. 280, 1892.	Melaphyre.	Not fresh.

MELAPHYRE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
7 A2. II	46.02	18.03	7.17	2.78	4.83	8.68	3.31	1.33	3.22		2.90	0.95	0.35		99.57	2.692
8 C4. V	54.93	17.73	13.55	n. d.	0.80	4.35	4.94	2.89	0.96					trace	100.15	
9 D4. V	37.79	18.35	11.79	n. d.	4.69	9.31	9.94	1.89	1.83		5.87		0.34	trace	101.80	
10 B4. V	57.67	24.37		n. d.	3.05	8.02	2.93	1.12	3.48						100.64	
11 A4. IV	52.61	18.94	9.60	n. d.	3.56	9.14	2.62	0.86	3.27						99.70	
12 D4. V	51.96	20.47	9.55	n. d.	2.27	4.14	3.90	2.15	5.65						100.08	
13 A4. IV	49.99	15.11	14.25	n. d.	4.71	6.04	3.52	1.42	4.78						99.77	
14 D4. V	49.02	20.25	9.30	n. d.	3.32	8.26	4.09	1.52	4.30						100.07	2.80
15 A4. IV	50.44	18.25	n. d.	8.93	7.86	7.14	3.25	0.64	3.01						99.52	

BASALT.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A1. I	47.52	13.91	7.06	3.76	6.84	5.71	3.06	0.77	4.55	1.75	3.68	1.19	0.15	0.18	100.13	
2 1. I	47.20	15.36	3.08	8.87	4.20	5.05	4.72	1.40	3.04	0.16	3.34	3.30	0.36	0.20	100.26	
3 D3. V	44.93	18.32	8.70	21.09	0.47	1.41	2.12	0.58	trace		trace	2.92			100.54	
4 D3. V	39.22	4.93	18.12	5.90	3.61	19.29	2.51	0.68	0.21		1.24	3.49			99.20	
5 A4. IV	55.68	18.93	n. d.	8.73	4.86	7.99	2.12	0.48	0.60						99.39	
6 A4. IV	51.92	19.76	11.21	n. d.	3.38	9.30	2.16	0.60	1.54	—					99.87	
7 A4. IV	51.66	11.22	7.62	n. d.	13.61	7.72	5.98	0.89	1.06			trace		0.12	100.13	
8 C2. IV	49.45	17.58	3.41	3.41	4.05	7.20	5.83	1.57	4.34			2.23		trace	99.07	2.738
9 A4. IV	45.51	15.82	15.31	n. d.	3.98	9.26	4.98	2.99	0.48						100.00	2.836

MELAPHYRE—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3	trace	Sommerberg, Thüringer Wald.	C. F. Steffen.	H. Loretz, Jb. Pr. G. L-A., IX, p. 306, 1889.	Melaphyre.	Not fresh.
		Tenczyner Garden, Cracow, Galicia.	R. Zuber.	R. Zuber, Jb. Wien G. R-A., XXXV, p. 752, 1885.	Melaphyre.	Al_2O_3 and Fe_2O_3 high. FeO and MgO low.
		Colmo di Provaglio, Val Sabbia, Piedmont.	C. Riva.	C. Riva, Rend. Inst. Lomb., XXVI, p. 435, 1893.	Olivine-melaphyre.	Not fresh. Na_2O high.
		Koktebel, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII Cong. G. Int., XXXI, p. 13, 1897.	Melaphyre.	Not fresh.
		Kobosa, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII Cong. G. Int., XXXIII, p. 27, 1897.	Melaphyre.	Not fresh.
		Karagatch, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII Cong. G. Int., XXXIII, p. 27, 1897.	Melaphyre.	Not fresh. Al_2O_3 high.
		Bodrak River, Crimea, Russia.	A. Lagorio.	A. Lagorio, Guide Exc. VII Cong. G. Int., XXXIII, p. 27, 1897.	Melaphyre.	Not fresh.
		Mount Kastel, Crimea, Russia.	R. Prendel.	R. Prendel, cf. N. J., 1887, II, p. 98.	Melaphyre.	Al_2O_3 high.
		Purikan, Persia.	C. v. John.	C. v. John, Jb. Wien G. R-A., XXXIV, p. 133, 1884.	Olivine-melaphyre.	

BASALT.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
NiO BaO SrO Li_2O	trace trace none trace	South Britain, Connecticut.	W. F. Hillebrand.	W. H. Hobbs, B. U. S. G. S., 168, p. 35, 1900.	Olivine-basalt.	Not fresh.
SO_3 F S CuO BaO SrO	trace trace trace trace trace trace	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, M. U. S. G. S., XXXVI, p. 106, 1899.	Metabasalt.	Complete in B. U. S. G. S., 148, p. 97, 1897.
		Alum Hill, Boulder County, Colorado.	C. I. Andrews.	C. I. Andrews, Proc. Colo. Sc. Soc., V, p. 151, 1895.	Basalt.	FeO high. MgO and CaO low.
		Alum Hill, Boulder County, Colorado.	C. I. Andrews.	C. I. Andrews, Proc. Colo. Sc. Soc., V, p. 150, 1895.	Basalt.	Al_2O_3 and MgO low. Fe_2O_3 and CaO high.
		Mount Thielson, Oregon.	F. W. Clarke.	J. S. Diller, B. U. S. G. S., 148, p. 230, 1897.	Hypersthene-basalt.	Not described.
		Pit River, Lassen Peak, California.	F. W. Clarke.	J. S. Diller, B. U. S. G. S., 148, p. 200, 1897.	Basalt.	Dried at 110°.
Cr_2O_3	0.25	Knoxville, California.	W. H. Melville.	G. F. Becker, M. U. S. G. S., XIII, p. 159, 1888.	Basalt.	
		Point Bonita, Marin County, California.	F. L. Ransome.	F. L. Ransome, B. Dep. G. Un. Cal., I, p. 106, 1893.	Basalt.	Not fresh?
		Mary Muss Bay, Jan Mayen, Arctic Ocean.	R. Scharitzer.	R. Scharitzer, Jb. Wien G. R-A., XXXIV, p. 718, 1884.	Basalt.	

BASALT—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
10 D4. V	47.95	23.75	12.72	n. d.	1.90	7.86	1.82	0.35	1.91						98.26	
11 D4. V	53.03	20.09	9.43	n. d.	2.63	6.05	4.52	1.27	2.64						99.66	
12 A2. II	45.24	17.08	1.84	8.02	5.74	4.64	5.32	0.13	5.66		2.98	2.40	0.57	0.14	99.76	2.62
13 D3. V	51.10	22.05	1.21	5.89	2.35	11.42	2.22	1.02	0.71		1.82		0.18		99.97	
14 D4. V	45.95	7.23	n. d.	25.02	1.71	5.17	5.91	1.51	6.14	0.39		1.08	0.38		100.49	
15 C3. V	43.23	21.37	1.69	9.53	3.57	6.66	5.63	trace	4.49		2.61		0.97	trace	100.08	2.82
16 D4. V	42.21	9.47	n. d.	23.40	2.16	6.20	5.30	1.76	7.18	0.35		1.57	0.51		100.11	
17 A4. IV	52.59	17.33	11.14	n. d.	2.62	6.47	4.24	2.40	3.27					0.66	100.72	
18 D4. V	49.00	21.70	13.30	n. d.	5.22	8.95	0.63	1.95	n. d.						100.75	
19 D4. V	47.23	24.25	11.33	n. d.	4.85	8.47	1.81	1.64	n. d.						99.58	
20 D4. V	44.50	21.50	14.90	n. d.	7.60	8.96	1.36	2.47	n. d						101.26	
21 D4. V	44.27	29.82		n. d.	5.83	11.69	3.29	1.94	2.51						99.35	2.864
22 D4. V	48.0	23.0	16.5	n. d.	0.8	5.0	1.0	n. d.	3.2			1.5			99.0	
23 D2. V	47.54	17.70	5.19	6.20	5.94	9.12	4.01	1.43	0.72		0.10	trace	0.62		98.64	2.79
24 A4. IV	52.60	14.17	11.38	n. d.	6.37	9.17	2.90	1.06	2.08			0.57			100.30	
25 D3. V	48.93	22.63	8.84	1.97	3.54	7.27	4.32	2.04	0.36	——		trace	trace	0.50	100.40	
26 C2. IV	53.83	15.85	6.87	4.09	5.56	7.68	3.02	0.72	0.84		0.32	1.73	0.26	0.21	101.64	2.911
27 C2. IV	49.05	14.36	4.25	6.35	8.38	8.38	3.42	2.26	1.57		0.40	2.18	0.09	0.24	101.87	2.945
28 A3. III	46.14	13.10	10.56	n. d.	12.55	9.97	2.61	2.02	1.02		trace	1.07	1.46	trace	100.50	

BASALT—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Laugervatus, Iceland.	R. Bréon.	R. Bréon, Geol. d'Islande, Paris, 1884, p. 37.	Basalt glass.	Sum low. Al_2O_3 high.
		Ardtun, Mull, Scotland.	G. A. J. Cole.	G. A. J. Cole, Q. J. G. S., XLIV, p. 303, 1888.	Tachylyte.	Al_2O_3 high.
		Victoria Park, Glasgow, Scotland.	P. Holland.	F. Rutley, Q. J. G. S., XLV, p. 631, 1889.	Tachylyte.	1 inch dike. Not fresh.
		Eycott Hill, Lake District, England.	J. Hughes.	Ward, Micros. Jour., 1887, p. 246 f.	Lava.	Cited in J. J. H Teall, Br. Petr. 1888, p. 228. Not fresh.
		Dinas Head, Cornwall.	J. J. Beringer.	H. Fox, Tr. R. Soc. Cornw., XII, p. 71, 1896.	Dolerite.	Not fresh. Al_2O_3 low. FeO high.
FeS_2	0.33	Pentire Point, Cornwall.	Phillips.	J. J. H. Teall, Brit. Petrog., London, 1888, p. 231.	Lava.	Al_2O_3 high. Not fresh.
		Round Hole Point, Cornwall.	J. J. Beringer.	H. Fox, Tr. R. Soc. Cornw., XII, p. 71, 1896.	Dolerite.	Not fresh. Al_2O_3 low. FeO high.
		The Beal, Portree, Ireland.	Hodgkinson.	Judd and Cole, Q. J. G. S., XXXIX, p. 455, 1883.	Basalt glass.	
		Banne d'Ordenche, Mount Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Basalt.	Al_2O_3 high.
		Puy Loup, Mount Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Basalt.	Al_2O_3 high.
		Banne d'Ordenche, Mount Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Basalt.	Al_2O_3 high.
		La Croix-Morand, Mount Dore, Auvergne.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 479, 1887.	Dolerite.	
		Alboran Island, Spain.	S. Traverso.	S. Traverso, Gior. Min., V, p. 203, 1894.	Labradorite.	
SO_3 Cl	trace 0.07	Señoreta, Columbretes Islands, Spain.	R. Pfohl.	F. Becke, T. M. P. M., XVI, p. 310, 1896.	Basalt.	
		Reichshofen, Vogesen.	G. Linck.	G. Linck, Mt. Com. G. L-U. Els., I, p. 52, 1888.	Basalt.	
		Kirmessplatz, Siebengebirge, Rh. Prussia.	E. Kaiser?	E. Kaiser, Vh. Nh. Ver. Bonn, LIV, p. 186, 1897.	Basalt.	Al_2O_3 high. Dried at 125°.
X SO_3 Cl	0.61 trace 0.05	Bühl, n. Cassel, Nassau.	O. Fromm.	O. Fromm, Z. D. G. G., XLIII, p. 72, 1891.	Basalt.	
X SO_3 Cl	0.79 0.07 0.08	Kl. Staufenberg, n. Cassel, Nassau.	O. Fromm.	O. Fromm, Z. D. G. G., XLIII, p. 74, 1891.	Basalt.	
Cr_2O_3 BaO	trace trace	Stempel, n. Marburg, Nassau.	F. W. Kuester.	M. Bauer, N. J., 1891, II, p. 159.	Basalt.	

BASALT—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O-	H_2O+	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
29 A4. IV	53.78	14.22	9.66	n. d.	7.12	7.44	3.11	0.89	1.73			2.22			100.46	
30 C4. V	52.87	16.36	10.87	n. d.	5.23	7.94	3.64	0.96	1.22						99.09	2.793
31 C2. IV	52.21	14.62	10.77	3.20	5.02	8.72	1.77	0.55	0.09		0.19	1.36	0.52		99.02	
32 C2. IV	49.06	13.66	7.55	4.00	8.45	8.90	4.03	1.00	1.30	——		2.93	0.31		101.19	
33 D2. V	47.39	11.54	12.47	7.13	6.24	8.83	3.80	0.73	2.79		0.18		0.97		102.07 (102.08)	
34 D2. V	44.64	16.14	19.35	2.52	0.96	10.78	1.65	2.24	0.27		0.13	0.78		0.61	100.23	2.794
35 D4. V	43.65	33.23		n. d.	2.03	8.70	5.43	6.48	0.61						100.13	
36 C1. IV	41.71	15.80	5.59	7.64	4.85	10.30	6.08	1.00	2.22		2.01	2.77	trace	0.16	101.45	2.900 21°
37 C2. IV	40.52	18.97	10.77	2.99	6.72	11.34	3.40	0.42	2.40	0.81		0.26	0.74		100.11	2.958
38 C2. IV	40.02	19.88	11.68	1.61	4.03	12.52	2.93	0.57	3.49	1.31		0.24	0.82		99.80	2.884
39 C1. V	47.55	14.82	n. d.	11.63	5.90	9.16	3.87	4.39	——			2.68			100.00	
40 C4. V	47.14	15.67	n. d.	11.17	3.60	11.85	2.90	2.20				4.00			100.00	
41 C4. V	46.57	16.10	n. d.	12.02	4.14	13.67	2.14	0.84				3.80			99.28	
42 A4. IV	44.49	13.35	n. d.	13.75	5.59	12.90	1.39	2.00	3.25			2.48	0.45		100.01	
43 D8. V	46.93	24.19	5.89	4.42	2.42	8.54	2.47	4.56	0.88					0.61	100.91	
44 C3. V	44.60	21.29	10.51	0.57	3.51	11.35	4.81	0.74	2.65						100.03	
45 C3. V	49.70	9.40	13.70	2.80	9.47	10.25	2.85	0.18	——				1.65	0.34	100.34	
46 C3. V	49.65	9.38	15.72	0.85	9.40	10.25	2.78	0.18	——				1.50	0.32	100.03	

BASALT—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Schiffenberg, Giessen, Hesse.	A. Streng.	A. Streng, Ber. Oberhes. Ges., XXIX, p. 99, 1893.	Anamesite.	
		Schwartzenfels, Rhöngebirge, Rh. Prussia.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 479, 1887.	Basalt glass.	
		Frauenberg, n. Breitfirst, Hesse.	R. Wedel.	R. Wedel, Jb. Pr. G. L-A., XI, p. 21^{x}, 1892.	Basalt.	
		Londorf, Vogelsberg, Hesse.	A. Streng.	A. Streng, N. J., 1888, II, p. 211.	Dolerite.	Not fresh. Dried at 100°.
		Michelnau, Vogelsberg, Hesse.	J. M. Ledroit.	J. M. Ledroit, Ber. Oberhes. Ges., XXIV, p. 151, 1886.	Basalt.	
SO_3 Cl	0.16 trace	Dolmesberg, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kte., Hesse, Bl. Messel, p. 33, 1886.	Basalt.	Fe_2O_3 high. MgO low.
		Bobenhausen, Vogelsberg, Hesse.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 493, 1887.	Tachylyte.	
X SO_3 Cl Li_2O	0.74 0.12 0.46 trace	Dachberg, Rhöngebirge.	P. Jannasch.	F. Rinne, Jb. Pr. G. L-A., VII, p. 9, 1887.	Basalt.	Not fresh.
SO_3 Cl	0.62 0.15	Kleinostheim, Hesse.	Not stated.	G. Klemm, Erl. G. Kte. Hesse. Bl. Schafheim, p. 33, 1894.	Basalt.	Al_2O_3 high? Iron oxides. SO_3 for S?
SO_3 Cl	0.61 0.09	Otzberg, Hesse.	Not stated.	G. Klemm, Erl. G. Kte. Hesse, Bl. Schafheim, p. 33, 1894.	Basalt.	Al_2O_3 high? Iron oxides. SO_3 for S?
		Schelingen, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 277.	Basalt.	Calc. to 100 after deducting 2.19 H_2O and 5.00 $CaCO_3$.
		Sponeck, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 277.	Basalt.	Not fresh. Calc. to 100 after deducting 4.25 H_2O.
		Sponeck, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 278.	Anamesite.	Not fresh. 3.27 H_2O. Ignited before analysis.
		Schönberg, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 308.	(Basalt?) Tuff.	
		Rongstock, Bohemia.	Student of P. Jannasch.	H. O. Lang, T. M. P. M., XV, 191, 1890.	Dolerite. (Essexite.)	Al_2O_3 high. MgO low. cf. No. 13 essexose.
		Burberg, Duppauer Mountains, Bohemia.	J. M. Clements.	J. M. Clements, Jb. Wien. G. R-A., XL, p. 345, 1890.	Basalt.	Al_2O_3 high? Fe_2O_3 high. FeO low.
		Brentonico, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Soc. Alp. Trident, XIX, p. 406, 1894-5.	Basalt.	Not fresh. $H_2O=7.56$. Ignited before analysis.
		Botte, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Soc. Alp. Trident, XIX, p. 406, 1894-5.	Basalt tuff.	Not fresh. Ignit=6.17. Ignited before analysis.

BASALT—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
47 C3. V	49.42	13.01	13.34	0.96	6.30	10.84	3.48	1.05	—			0.04	1.25	0.21	99.90	2.34 20°
48 C3. V	48.52	12.90	14.19	2.82	8.23	7.54	3.19	none	—				1.71	0.21	99.31	2.30 20°
49 D3. V	48.52	12.80	15.39	1.52	8.33	7.84	3.29	none	—				1.29	0.21	99.19	2.12 20°
50 D4. V	43.70	23.44	3.14	5.27	3.54	13.05	4.86	n. d.	2.40		2.92				102.32	
51 C4. V	49.10	13.64	17.21	n. d.	5.30	8.20	4.10	1.32	0.70			trace	1.60		101.17	2.96 16°
52 B4. V	46.60	12.50	16.92	n. d.	6.29	9.74	3.39	1.15	1.65				1.05		99.29	
53 D4. V	44.2	20.9	12.2	n. d.	2.5	6.6	6.1	4.6	n. d.						97.1	
54 A4. IV	50.34	16.72	15.12	n. d.	3.96	8.00	3.78	1.83	0.72						100.47	
55 D4. V	55.82	31.29		n. d.	0.44	3.91	4.60	4.26	0.58						100.90	
56 C4. V	51.00	15.80	10.96	n. d.	4.70	11.17	2.54	1.15	0.30	0.13	0.93		0.56		99.24	
57 A4. IV	50.55	16.58	8.18	n. d.	6.10	11.45	3.15	3.16	0.06				0.67		99.90	
58 A2. II	50.15	12.08	9.07	6.53	3.88	10.52	3.08	2.77	0.24				0.67	0.82	100.51	
59 A2. II	51.31	12.54	4.87	7.42	2.90	10.01	3.23	1.36	5.63			0.32	0.52	trace	100.17	2.656 17°
60 A3. III	35.48	8.30	12.30	14.60	7.10	1.04	3.92	trace	16.80			none			99.54	
61 A4. IV	53.42	15.08	17.13	n. d.	2.24	8.72	3.25	trace	2.34			0.85	trace		100.69	
62 B3. IV	49.95	14.77	7.41	3.53	4.28	10.26	2.87	2.63	3.40					trace	99.10	
63 B4. V	48.25	19.23	10.87	n. d.	5.17	7.91	3.86	1.67	3.16						100.12	
64 C4. V	47.00	16.60	11.00	n. d.	9.80	11.38	3.00	0.46	1.89						101.13	
65 D2. V	46.20	13.40	4.00	8.56	10.92	12.24	2.82	0.48	0.18			2.18	0.53	0.28	101.79	

BASALT—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Sano, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Soc. Alp. Trident., XIX, p. 408, 1894–5.	Basalt (altered).	Not fresh. Ignit=6.24. Ignited before analysis.
		Foianeghe, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Soc. Alp. Trident., XIX, p. 408, 1894–5.	Basalt tuff.	Not fresh. Ignit=6.75. Ignited before analysis.
		Nomesino, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Soc. Alp. Trident., XIX, p. 410, 1894–5.	Basalt.	Not fresh. Ignit=7.74. Ignited before analysis.
		Fee Gletscher Alp, Pennine Alps, Switzerland.	A. A. Longsden.	T. G. Bonney, Q. J. G. S., XLIX, p. 97, 1893.	Basalt altered.	Not fresh. Al_2O_3 high. MgO low. Calc. from sol. and insol.
		Mosc' al Bo, Euganean Hills, Italy.	Not stated.	G. dal Piaz, Riv. Min. Crist, XVI, p. 65, 1896.	Basalt.	
		Castelnuovo, Euganean Hills, Italy.	Not stated.	G. dal Piaz, Riv. Min. Crist, XVI, p. 69, 1896.	Basalt.	
		Scajara, n. Battaglia, Euganean Hills.	S. Bertolio.	S. Bertolio, B. Soc. G., Fr. (3), XXI, p. 433, 1894.	Basalt.	
		Cala Rossa, Island of Capraia, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 143, 1893.	Basalt.	Scoria.
		Eruption of 1888–9, Volcano, Lipari Islands.	O. Silvestri.	G. Mercalli, Gior. Min., III, p. 108, 1892.	Dolerite.	Bomb.
		Notaro, Filicudi, Æolian Islands.	F. Glaser.	A. Bergeat, Abh. Münch. Akad., XX, p. 207, 1899.	Basalt.	
		Sciarra, Stromboli, Æolian Islands.	F. Glaser.	A. ergeat, N. J., 1897, II, p. 113.	Basalt.	
SO_3 Cl	0.64 0.06	Eruption of 1891, Stromboli, Lipari Islands.	L. Ricciardi.	Ricco and Mercalli, cf. N. J., 1893, I, p 492	Basalt ashes.	
Cr_2O_3	0.06	Eruption Nov. 16, 1884, Mt. Etna, Sicily.	L. Ricciardi.	L. Ricciardi, Att. Acad. Gioen., XVIII, p. (4), 1884.	Basalt ashes.	
		Franz Joseph Land, Arctic Ocean.	J. J. H. Teall.	J. J. H. Teall, Geol. Mag., XXXIV, p. 554, 1897.	Palagonite.	
		Rovno, Wolhynia, Russia.	Blümel.	St. Pfaffius, cf. N. J., 1888, II, p. 78.	Basalt.	Contains metallic iron.
		Jalguba, Olonez, Russia.	L. Lessing.	L. Lessing, T. M. P. M., VI, p. 294, 1885.	Variolite.	
		Cap Marsa, Menerville, Algeria.	Not stated.	Duparc, Pearce and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 94, 1900.	Basalt.	Al_2O_3 high.
		Kimberley, Griqualand, South Africa.	Not stated.	L. de Launay, C. R., CXXV, p. 336, 1897.	Basalt.	
		Punta Delgada, San Miguel, Azores.	C. v. John.	C. v. John, Jb. Wien. G. R-A., XLVI, p. 289, 1896.	Anamesite.	

BASALT—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
66 D3. V	48.09	19.05	3.44	5.59	3.50	9.42	5.06	2.88	0.67			4.38			102.08	
67 C2. IV	53.75	11.20	12.26	0.69	9.11	5.72	0.76	0.87	4.91			0.36		0.16	100.19	2.867
68 B4. V	50.53	18.36	11.76	n. d.	4.40	9.33	2.07	3.23	1.35	—					101.03	
69 D3. V	48.24	20.64	4.63	5.55	5.02	7.94	5.08	1.88	0.02				0.97		99.97	2.733
70 D3. V	47.74	20.95	3.29	6.32	5.16	7.56	7.12	1.21	0.04				0.13		99.52	2.736
71 D3. V	47.50	19.32	4.75	5.20	4.36	8.37	7.63	2.31	0.46				0.21		100.11	2.704
72 D4. V	50.00	22.80	14.15	4.05	1.93	3.17	1.99		0.33			0.42	trace	0.97	99.81	2.77
73 D4. V	48.60	25.45	17.55	1.20	0.98	2.20	1.38		1.87			trace	trace	trace	99.23	2.80
74 B3. V	45.30	14.90	10.87	8.20	3.78	6.58	5.23	1.77	1.20			trace	0.25	0.91	98.99	2.79
75 B3. IV	51.77	15.66	8.46	6.54	4.95	9.56	2.17	0.96	n. d.					0.82	100.89	
76 C2. IV	47.44	16.51	15.33	3.19	8.80	6.02	1.60	0.30	—				0.61	0.37	100.48	
77 C1. III	47.33	17.96	12.64	0.51	3.97	6.29	3.67	1.10	—			4.84	1.05	0.64	100.29	
78 C1. III	40.11	12.40	14.64	trace	11.65	12.24	2.72	0.96	—		4.15		0.57	0.25	99.97	
79 C1. III	37.82	13.16	14.11	0.14	11.75	13.39	1.66	1.49	—		5.56		0.82	0.24	100.41	
80 C1. III	36.85	11.97	13.90	6.54	10.73	9.00	4.13	0.79	—			4.05	1.25	1.13	100.62	
81 C1. III	35.86	12.10	7.82	8.09	9.72	12.08	6.23	1.93	—			2.90	1.08	0.39	100.12	
82 C2. IV	34.81	33.18	23.03	2.34	0.39	trace	trace	trace	—			4.89	0.39	0.28	99.99	

BASALT—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Inaccessible Island, Tristan d'Acunha, Atlantic Ocean.	C. Klement.	A. Renard, Challenger Rep., Petr. Oc. Islds., 1889, p. 88.	Tachylyte.	
	Jenissei River, Siberia.	J. P. Tolmatschow.	J. P. Tolmatschow, cf. N. J., 1900, I, p. 388.	Variolite.	
	Buhemin, Elburz Mountains, Persia.	E. Drasche.	E. Drasche, Vh. Wien. G. R-A., XVIII, p. 196, 1884.	Basalt.	
	Well Digging, Kula, Asia Minor.	A. Röhrig.	H. S. Washington, A. J. S., XLVII, p. 122, 1894. Also In. Diss., Leipzig, 1894.	Kulaite.	Alkalies incorrect. Cf. No. 15 essexose.
	Hermos River, Kula, Asia Minor.	A. Röhrig.	H. S. Washington, A. J. S., XLVII, p. 122, 1894. Also In. Diss., Leipzig, 1894.	Leucite-kulaite.	Alkalies incorrect. Cf. No. 14 essexose.
	Kula Devit, Kula, Asia Minor.	A. Röhrig.	H. S. Washington, A. J. S., XLVII, p. 122, 1894. Also In. Diss., Leipzig, 1894.	Kulaite.	Alkalies incorrect.
	Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. Com. G. Ital., XIX, p. 171, 1888.	Basaltoid.	Al_2O_3 high.
	Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. Com. G. Ital., XIX, p. 169, 1888.	Basaltoid.	Al_2O_3 high.
	Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. Com. G. Ital., XIX, p. 180, 1888.	Basaltoid.	
	Kilauea, Hawaii, Hawaiian Islands.	A. H. Phillips.	A. H. Phillips, A. J. S., XLVII, p. 473, 1894.	Basalt.	Stalagmite.
SO_3 0.06 CuO 0.08	Salt Lake, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 427, 1896.	Basalt tuff.	Not fresh. $H_2O+=5.04$. $H_2O-=9.08$. Ignited before analysis.
SO_3 0.07 S 0.07 CuO 0.15	Mount Kohala, Waimea, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Not fresh. $H_2O+=3.08$. $H_2O-=2.38$. Ignited before analysis.
SO_3 0.17 CuO 0.11	Diamond Head, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 427, 1896.	Basalt tuff.	Not fresh. $H_2O+=6.48$. $H_2O-=5.46$. Ignited before analysis.
SO_3 0.15 FeS_2 0.05 CuO 0.07	Punch Bowl, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 427, 1896.	Basalt tuff.	Not fresh. $H_2O+=8.24$. $H_2O-=9.98$. Ignited before analysis.
SO_3. trace S 0.14 CoO 0.04 CuO 0.10	Panahou, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt, scoria.	Not fresh. $H_2O+=4.74$. $H_2O-=5.48$. Ignited before analysis.
SO_3 0.27 FeS_2 1.40 CuO 0.25	Panahou, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt, lapilli.	Not fresh. H_2O not given. Ignited before analysis.
SO_3 0.31 CuO 0.37	Honolulu, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons. A. J. S., II, p. 427, 1896.	Basalt.	Not fresh. $H_2O+=11.63$. $H_2O-=6.43$. Ignited before analysis.

BASALT—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
83 C2. IV	24.62	23.89	37.85	2.08	0.99	trace	1.41	trace	——			8.12	0.24	0.25	100.12	
84 C2. IV	4.54	41.35	40.87	2.52	0.37	trace	trace	trace	——			8.99	0.63	0.08	100.16	
85 D3. V	46.76	17.71	1.73	10.92	10.37	11.56	1.83	0.17	n. d.					0.44	101.49	
86 C4. V	44.73	16.28	14.57	n. d.	2.23	1.88	4.50	4.02	9.56					2.89	100.64	
87 A4. IV	45.13	18.13	12.94	n. d.	7.33	11.23	2.14	0.98	2.18						100.06	

NEPHELITE-PLAGIOCLASE ROCKS.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A1. I	48.90	14.70	4.14	3.68	3.95	8.26	5.22	0.56	2.44	0.52	5.42	0.95	0.79	0.03	100.04	
2 A3. III	46.45	15.49	4.86	6.83	3.47	9.38	3.23	0.57	3.80		4.90		0.85		99.83	
3 A3. III	43.40	13.60	6.66	6.83	8.15	9.05	1.66	0.64	3.20		7.10		0.26		100.55	
4 A3. III	42.15	18.75	4.94	7.30	3.74	9.75	3.34	2.07	4.35		3.10		0.58		100.07	
5 A3. III	39.20	15.52	8.80	5.08	6.49	14.45	2.04	1.11	3.70		2.80		1.18		100.37	
6 A3. III	38.85	15.65	10.43	8.88	1.49	11.35	1.96	0.62	4.50		6.25		0.62		100.60	
7 D4. V	42.08	20.03	7.61	n. d.	3.52	10.62	(4.50)		4.54		5.51		1.59		100.00	
8 B4. V	38.35	9.18	20.32	n. d.	13.78	11.76	2.77	2.02	1.20						99.38	3.22
9 A1. I	48.61	20.74	4.29	0.22	2.11	0.25	0.16	0.77	7.07	12.10		3.57	0.29	none	100.81	
10 A1. I	35.03	9.80	5.55	4.98	9.78	15.09	2.04	2.16	2.05	0.41	7.83	2.20	1.99	0.06	99.66	2.99 23°
11 D3. V	48.05	18.65	2.90	4.70	2.28	7.50	6.19	5.16	n. d.		n. d.	2.60		0.28	98.31	2.665
12 C4. V	42.20	10.32	n. d.	11.85	14.82	12.96	3.44	0.64	——			2.92			100.00	

BASALT—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 CuO	0.40 0.27	Hilo, Hawaii, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 427, 1896.	Basalt.	Not fresh. $H_2O+=12.70$. $H_2O-=8.49$. Ignited before analysis.
SO_3 CuO	0.55 0.26	Kaneohe, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 427, 1896.	Basalt.	Weathered. $H_2O+=20.48$. $H_2O-=3.55$. Ignited before analysis.
		Lat. 13° 28′ S (sic), Long. 149° 30′ W., S. Pacific Ocean.	A. F. Renard.	Murray and Renard, cf. N. J., 1893. II, p. 308.	Basalt glass.	Latitude?
		Lat. 18° 28′ S (sic), Long. 149° 30′ W., S. Pacific Ocean.	A. F. Renard.	Murray and Renard, cf. N. J., 1893. II, p. 308.	Palagonite.	Latitude?
		Cape Adare, Antartic Continent.	J. A. Schofield.	David, Smeeth and Schofield, J. R. Soc. N. S. W., XXIX, p. 477, 1895.	Basalt.	

NEPHELITE-PLAGIOCLASE ROCKS.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 BaO SrO Li_2	0.04 0.31 0.13 trace	Shield's River, Crazy Mountains, Montana.	H. N. Stokes.	W. H. Weed, B. U. S. G. S., 148, p. 146, 1897.	Theralite.	Not fresh.
		Hotzendorf, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. Wien, G. R-A., XXX, p. 72, 1896.	Teschenite.	Not fresh.
		Lohtka, Frankstadt, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. Wien, G. R-A., XXX, p. 73, 1896.	Teschenite.	Not fresh.
		Blauendorf, Neutitschein, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. Wien, G. R-A., XXX, p. 71, 1896.	Teschenite.	Not fresh.
		Jasenitz, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. Wien, G. R-A., XXX, p. 74, 1896.	Teschenite.	Not fresh.
		Neutitschein, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. Wien, G. R-A., XXX, p. 72, 1896.	Teschenite.	Not fresh.
		Söhla, Silesia.	C. E. M. Rohrbach.	C. E. M. Rohrbach, T. M. P. M., VII, p. 49, 1886.	Teschenite.	Not fresh. Al_2O_3, high, Alkalies by difference.
		Pilot Knob, Austin, Texas.	J. F. Kemp.	J. F. Kemp, Am. G., VI, p. 293, 1890.	Nephelite-basalt.	
F Cr_2O_3 BaO SrO	0.63 trace none none	Anna Lee Mine, Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, B. U. S. G. S., 148, p. 162, 1897.	Nephelite-basalt.	"Altered." Not described.
ZrO_2 SO_3 Cl FeS_2 BaO SrO	none none trace 0.38 0.14 0.17	Appie Ellen Shaft, Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, 16 A. R. U. S. G. S., II, p. 50, 1890.	Nephelite-basalt.	"Altered."
		Picota, Serra de Monchique, Portugal.	G. Pajkull.	Kraatz-Koschlau and Hackmann, T. M. P. M., XVI. p. 275, 1896.	Nephelite-tephrite.	Low sum due to H_2O and CO_2?
		Lützelberg, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, Leipzig, 1892, p. 274.	Basanite.	Not fresh. Calc. to 100, after deducting 3.00 H_2O.

NEPHELITE-PLAGIOCLASE ROCKS—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O−	H_2O—	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
13 A3. III	41.78	12.61	8.39	7.38	5.23	13.62	2.58	1.19	3.66		4.49				100.31	
14 D1. IV	44.10	12.80	5.43	5.73	10.66	10.57	2.84	1.24	3.90		0.36	2.46	0.55	0.18	101.79	2.956
15 D2. V	42.68	15.02	7.95	6.09	4.99	9.77	4.97	1.42	3.61		0.46	2.48		0.21	101.95	2.925
16 C3. V	44.20	17.03	5.30	5.70	7.20	9.10	5.90	2.95	3.83						101.21	
17 D2. V	42.71	17.05	0.92	7.66	5.49	12.31	10.48	2.81	0.60			0.60	0.96		101.59	3.095
18 A4. IV	52.55	14.63	10.70	n. d.	1.71	6.37	3.83	3.48	6.72				0.63		100.62	
19 D2. V	45.28	12.95	9.83	4.73	3.82	10.91	3.34	2.03	1.88	0.69	0.16	1.60	0.70	0.91	98.83	2.785
20 C2. IV	38.39	17.38	6.49	6.83	7.12	13.14	4.79	2.33	1.01		0.21	0.19	1.74	1.41	101.03	3.05
21 B3. IV	40.99	16.50	10.62	n. d.	3.29	12.63	5.95	2.36	2.63			2.41	0.89	0.35	99.62 .08 99.54	2.91

MONCHIQUITE, ETC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O−	H_2O—	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 C3. V	45.58	15.87	4.65	6.37	8.32	9.91	3.42	1.61	3.14					trace	98.87	
2 D3. V	45.13	18.06	11.88	0.32	1.12	10.17	3.57	6.06	3.04				0.39		99.74	
3 D3. V	40.37	17.86	14.45	0.38	1.63	17.61	1.29	0.83	4.47						99.39	
4 A2. II	42.57	15.90	2.10	6.85	3.18	10.55	4.71	3.88	2.00		4.87	2.50	trace	0.79	99.90	
5 B1. V	41.37	16.25	16.93	n. d.	4.57	12.35	4.18	3.98	0.45						100.08	
6 B1. V	40.47	11.86	17.44	n. d.	3.10	16.80	1.90	4.21	3.60						99.38	3.102
7 D1. V	31.80	18.78	15.20	n. d.	3.32	14.60	1.10	5.07	8.10				0.95		98.92	2.939
8 C4. V	38.07	17.92	14.08	n. d.	8.87	11.70	0.96	2.23	5.50						99.33	
9 C3. V	46.98	17.07	1.85	7.02	8.29	12.15	2.54	0.53	4.86				0.09		101.38	3.20

NEPHELITE-PLAGIOCLASE ROCKS—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Hamberg, Neckarelz, Baden.	E. E. Dana.	F. Schalch, G. Sp. K. Bad., Bl. Mosbach, p. 32, 1894.	Nephelite-basalt.	Not fresh.
X SO_3 Cl	0.71 0.09 0.17	Linsberg, Rhöngebirge.	E. Möller.	E. Möller, N. J., 1888, I, p. 105.	Nephelite-basanite.	
X Cl	2.30 trace	Linsberg, Rhöngebirge.	E. Möller.	E. Möller, N. J., 1888, I, p. 102.	Nephelite-basanite.	
		Steinerberg, Schorbach, Hesse.	Keim.	H. Wolff, cf. N. J., 1891 II, p. 279.	Nephelite-basanite.	
		Bubenik, Grossdehsa, Saxony.	O. Beyer.	O. Beyer, T. M. P. M., X, p. 14, 1889.	Nephelite-basalt.	Na_2O high, cf. reference.
SO_3 Cl	trace trace	Liebwerda, Bohemia.	F. Ullik.	J. E. Hibsch, T. M. P. M., XV, p. 237, 1896.	Tephrite tuff.	Not fresh.
SO_3	trace	Schichenberg, n. Tetschen, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIV, p. 105, 1894.	Nephelite-leucite-tephrite.	Alkalies low?
SO_3	none	St. Georgsberg, Randnitz, Bohemia.	J. Hoffmann.	J. Hoffmann, cf. N. J., 1898, II, p. 59.	Nephelite-basalt.	MnO high.
SO_3 Cl	0.64 0.36	Teufelsmühle, Hochstraden, Styria.	A. Jäger.	A. Sigmund, T. M. P. M., XVI, p. 347, 1897.	Nephelinite.	

MONCHIQUITE, ETC.

		Shelburne Point, Burlington, Vermont.	H. T. Vulté.	J. F. Kemp in Weed and Pirsson, B. U. S. G. S., 139, p. 116, 1896.	Monchiquite.	New analysis of next No.
		Shelburne Point, Burlington, Vermont.	W. H. Morrison.	Kemp and Marsters, B. U. S. G. S., 107, p. 34, 1893.	Monchiquite.	Al_2O_3, Fe_2O_3, and K_2O high. FeO and MgO low. Same as above.
		Burlington, Vermont.	W. H. Morrison.	Kemp and Marsters, B. U. S. G. S., 107, p. 34, 1893.	Monchiquite.	Al_2O_3, Fe_2O_3, and CaO high. FeO, MgO and alkalies low.
S	trace	S. Berge, Alnö, Sweden.	N. Sahlbom.	N. Sahlbom, N. J., 1897, II, p. 98.	Monchiquite.	Not fresh.
		Beemerville, Sussex County, New Jersey.	F. W. Love.	J. F. Kemp, Tr. N. Y. Ac. Sci., XI, p. 69, 1892.	Ouachitite.	Al_2O_3 high?
		Rutan's Hill, Sussex County, New Jersey.	J. F. Kemp.	J. F. Kemp, A. J. S., XXXVIII, p. 133, 1889.	Ouachitite.	Not fresh.
		Beemerville, Sussex County, New Jersey.	J. F. Kemp.	J. F. Kemp, A. J. S., XXXVIII, p. 133, 1889.	Ouachitite.	Al_2O_3 high. Not fresh.
		Tatumville, Saline County, Arkansas.	J. F. Kemp.	J. F. Kemp in J. F. Williams, A. R. G. S. Ark., 1890, p. 399, 1891.	Ouachitite.	
		Angel Island, California.	F. L. Ransome.	F. L. Ransome, B. Dep. G. Un. Cal., I, p. 231, 1894.	Fourchite.	

LEUCITE-PLAGIOCLASE ROCKS, ETC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 D2. V	52.06	23.13	8.52	1.75	2.24	3.30	5.37	3.10	1.17			0.16	0.20	trace	101.00	
2 D4. V	43.49	15.43	8.52	n. d.	3.63	8.36	(12.77)		4.49		3.31				100.00	
3 D4. V	50.43	25.04	3.48	n. d.	4.51	7.49	5.17	1.08	2.61						99.71	
4 D2. V	44.16	12.96	8.07	3.10	10.83	12.26	1.92	0.72	2.41	0.46		2.06	1.03		99.98	2.965
5 D3. V	56.32	17.07	3.11	6.03	2.05	6.53	2.24	4.03	2.04				0.93	0.13	100.48	2.492
6 D3. V	56.07	16.31	1.64	8.39	3.04	5.94	1.22	5.27	1.17				0.92	0.14	100.09	2.552
7 D3. V	55.11	16.07	3.04	8.46	3.10	6.46	1.58	5.07	0.89				0.75		100.53	2.546
8 D3. V	55.08	17.52	2.11	6.17	2.41	6.19	1.37	4.32	4.03				1.02	0.10	100.32	2.492
9 D3. V	52.71	14.41	2.22	8.03	5.11	11.06	1.34	2.55	1.01				1.47	0.12	100.03	2.816
10 D3. V	52.16	15.03	3.17	8.42	4.69	10.07	2.38	2.47	0.72				1.15	0.24	100.50	2.749
11 D3. V	51.94	14.78	2.94	9.13	2.63	8.51	2.08	5.33	2.12				0.62	0.17	100.25	
12 D3. V	48.51	14.56	3.21	8.19	4.12	10.69	2.15	4.24	2.80				0.95	0.16	99.58	2.726
13 D3. V	51.24	15.26	3.70	8.48	4.04	7.63	1.08	2.85	5.29				0.58	0.12	100.27	
14 D3. V	50.19	16.86	2.12	7.32	3.66	11.40	2.11	3.78	1.17				1.39	0.21	100.21	2.708
15 D3. V	49.34	18.99	3.11	6.07	3.51	7.89	1.89	6.03	1.98				1.31	0.26	100.38	2.562
16 D3. V	49.23	15.04	1.39	9.03	8.02	13.58	1.07	1.54	0.93				0.17	0.37	100.37	

LEUCITE-PLAGIOCLASE ROCKS, ETC.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Cerro de las Virgenes, Lower California, Mexico.	Jäger.	K. v. Chrustchoff, T. M. P. M., VI, p. 168, 1885.	Leucitophyre.	Al_2O_3 high. MgO low. Alkalies interchanged? Mean of 2 anals.
	Sta. Cruz, Rio de Janeiro, Brazil.	Not stated.	E. Hussak, N. J. 1892, II, p. 152.	Leucite-tephrite.	Alkalies by difference.
	Clermain, n. Cluny, France.	Not stated.	Michel Lévy and Lacroix, B. Serv. Cte. G. Fr., VII, No. 45, p. 9, 1895.	Leucotephrite.	Al_2O_3 high. Alkalies low.
	Dobernberg, Tetschen, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XIV, p. 111, 1894.	Leucite-basanite.	Alkalies low. Leucite-basalt in T. M. P. M., XV, p. 255, 1895.
	Montalto, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 115.	Leucite-basanite.	Alkalies low. Also in N. J. B. B., VI, p. 28, 1889.
	Montalto, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 115.	Leucite-basanite.	Alkalies low. Also in N. J. B. B., VI, p. 28, 1889.
	Montalto, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 115.	Leucite-basanite.	Alkalies low. Also in N. J. B. B., VI, p. 28, 1889.
	Montalto, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 115.	Leucite-basanite.	Alkalies low. Also in N. J. B. B., VI, p. 28, 1889.
	Canonica, Orvieto, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 108.	Leucitite.	Alkalies low. Also in N. J. B. B., VI, p. 20, 1889.
	Monte Bisenzio, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 106.	Leucite-tephrite.	Alkalies low. Also in N. J. B. B., VI, p. 19, 1889.
	Fosso Pantacciano, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 111.	Leucite-basanite.	Alkalies low. Also in N. J. B. B., VI, p. 23, 1889.
	Fosso Pantacciano, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 108.	Leucitite.	Alkalies low. Also in N. J. B. B., VI, p. 20, 1889.
	Toscanella, n. Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 106.	Leucite-tephrite.	Alkalies low. Also in N. J. B. B., VI, p. 19, 1889.
	San Magno, W. of Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 108.	Leucite-tephrite.	Alkalies low. Also in N. J. B. B., VI, p. 20, 1889.
	Gradoli, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 119.	Leucite-tephrite tuff.	Alkalies low. Also in N. J. B. B., VI, p. 32, 1889.
	Montefiascone, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad. 1888, p. 111.	Leucite-basanite.	Alkalies low. Also in N. J. B. B., VI, p. 23, 1889.

LEUCITE-PLAGIOCLASE ROCKS, ETC.—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
17 D3. V	49.18	16.07	1.17	8.94	5.43	13.26	1.25	2.07	1.62				0.41	0.42	100.30	
18 D3. V	48.84	15.45	2.78	9.62	5.37	13.29	1.24	1.83	0.72				0.22	0.34	100.26	
19 D3. V	47.61	17.38	2.03	7.24	6.21	15.61	0.86	1.81	0.64				0.61	0.21	100.21	2.731
20 D3. V	49.03	16.07	1.76	10.05	3.94	12.04	1.73	3.06	1.38				0.27	0.44	100.34	
21 D3. V	48.75	16.03	1.83	10.12	4.02	11.72	1.89	2.94	1.39				0.31	0.42	100.04	
22 D3. V	48.30	15.07	1.53	9.18	7.48	13.95	0.94	1.73	1.78				0.47	0.29	100.72	
23 D3. V	48.28	16.51	3.07	7.62	4.03	12.50	0.86	1.84	3.51				1.71	0.16	100.09	2.769
24 D3. V	48.09	13.60	2.52	9.36	6.75	13.05	1.41	3.07	1.62				0.41	0.10	99.98	2.762
25 D4. V	51.42	18.57	n.d.	8.47	0.48	2.74	10.38	6.42	0.88	——			0.14	trace	100.23	2.49
26 D3. V	48.38	19.03	n.d.	10.57	1.13	5.69	4.40	8.65	0.64	——		0.15	0.33	trace	100.61	2.67
27 D4. V	47.50	28.38	3.68	n.d.	1.36	5.03	trace	4.60	6.00	3.40				trace	99.95	2.35
28 D4. V	46.85	21.49	5.21	n.d.	0.96	8.54	trace	4.68	8.10	3.80				trace	99.63	2.16
29 D4. V	46.59	27.12	5.83	n.d.	0.53	4.76	trace	2.04	8.90	3.90				trace	100.67	2.02
30 D4. V	46.57	19.86	n.d.	8.97	1.82	10.38	3.13	7.48	1.29	——			0.44	0.93	100.87	2.67
31 C3. V	45.93	18.27	n.d.	9.39	4.41	10.98	3.99	6.28	0.83	——		0.09	0.39	0.06	100.62	2.62
32 C3. V	45.71	17.90	n.d.	9.69	3.87	10.56	4.85	5.21	1.82	——		trace	0.34	0.54	100.61	2.78
33 D4. V	45.02	22.57	——	8.94	2.35	10.09	3.28	7.13	0.91	——			0.40	trace	100.69	2.83
34 D4. V	46.15	23.19	6.42	n. d.	2.25	8.52	trace	3.01	5.50	4.90				trace	99.94	2.33

LEUCITE-PLAGIOCLASE ROCKS, ETC.—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO$_3$	0.48	Montefiascone, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 108.	Leucitite.	Alkalies low. Also in N. J. B. B., VI, p. 20, 1889.
SO$_3$	0.56	R. R. tunnel, Montefiascone, Lake Bolsena.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 108.	Leucitite.	Alkalies low. Also in N. J. B. B., VI, p. 20, 1889.
		Montefiascone, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 111.	Leucite-basanite.	Alkalies low. Also in N. J. B. B., VI, p. 23, 1889.
SO$_3$	0.57	Sassi Lanciati, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 108.	Leucitite.	Alkalies low. Also in N. J. B. B., VI, p. 20, 1889.
SO$_3$	0.62	Sassi Lanciati, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 108.	Leucitite.	Alkalies low. Also in N. J. B. B., VI, p. 20, 1889.
		Monte Jugo, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 108.	Leucitite.	Alkalies low. Also in N. J. B. B., VI, p. 20, 1889.
		Santa Trinita, Orvieto, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 106.	Leucite-tephrite.	Alkalies low. Also in N. J. B. B., VI, p. 19, 1889.
		Valentano, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Berl. Akad., 1888, p. 111.	Leucite-basanite.	Alkalies low. Also in N. J. B. B., VI, p. 23, 1889.
SO$_3$	0.73	Tavolato, Alban Hills, Italy.	G. Aichino.	V. Sabatini, Mem. Cta. G. Ital., X, p. 164, 1900.	Leucite-tephrite (with haüyne).	Al$_2$O$_3$ high. MgO low. Dried at 110°.
SO$_3$	1.64	Lago di Nemi, Alban Hills, Italy.	G. Aichino.	V. Sabatini, Mem. Cta. G. Ital., X, p. 164, 1900.	Leucite-tephrite (with haüyne).	Al$_2$O$_3$ high. MgO low. Dried at 110°.
Cr$_2$O$_3$	trace	Via Ardeatina, Alban Hills, Italy.	Trottarelli.	A. Verri, B. Soc. G. Ital., XII, p. 72, 1893.	Leucitite-tuff.	Al$_2$O$_3$ high?
Cr$_2$O$_3$	trace	Casale Caffarella, Alban Hills, Italy.	Trottarelli.	A. Verri, B. Soc. G. Ital., XII, p. 54, 1893.	Leucitite-tuff.	
Cr$_2$O$_3$	trace	Alban Hills, Italy.	Trottarelli.	A. Verri, B. Soc. G, Ital., XII, p. 60, 1893.	Leucitite-tuff.	
		Rocca di Papa, Alban Hills, Italy.	G. Aichino.	V. Sabatini, Mem. Cta. G. Ital., X, p. 163, 1900.	Leucitite.	Not fresh. Dried at 110°. Al$_2$O$_3$ high. MgO low.
SO$_3$	trace	Rocca di Papa, Alban Hills, Italy.	G. Aichino.	V. Sabatini, Mem. Cta. G. Ital., X, p. 163, 1900.	"Sperone."	Dried at 110°. Not fresh.
SO$_3$	0.12	Rocca di Papa, Alban Hills, Italy.	G. Aichino.	V. Sabatini, Mem. Cta. G. Ital., X, p. 163, 1900.	"Sperone."	Dried at 110°. Not fresh.
		Rocca di Papa, Alban Hills, Italy.	G. Aichino.	V. Sabatini, Mem. Cta. G. Ital., X, p. 163, 1900.	Leucitite.	Dried at 110°.
Cr$_2$O$_3$	trace	Cava di San Paolo, Alban Hills, Italy.	Trottarelli.	A. Verri, B. Soc. G., Ital., XII, p. 53, 1893.	Leucitite tuff.	Al$_2$O$_3$ high.

LEUCITE-PLAGIOCLASE ROCKS, ETC.—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
35 B4. V	59.92	18.09	4.52	n. d.	0.44	2.19	6.23	7.24	1.17						99.80	
36 C4. V	47.25	18.17	9.23	n. d.	3.74	8.65	3.93	7.15	0.94			trace			99.06	2.723
37 D4. V	51.38	26.35		n. d.	6.03	9.09	4.76	3.33	n. d.						100.93	
38 A4. IV	47.13	14.47	13.56	n. d.	4.16	9.00	0.81	8.00	2.94						100.07	
39 B4. V	47.31	18.51	14.56	n. d.	2.28	7.57	0.98	6.14	2.31				0.55		100.21	2.910
40 B4. V	46.43	15.99	15.04	n. d.	1.74	9.27	0.51	6.93	3.20				0.73		99.84	2.890

HAUYNOPHYRE, ETC.

1 D4. V	54.00	24.10	8.95	n. d.	2.35	4.65	5.60	1.58	n. d.						101.23	
2 D4. V	53.60	22.57	6.78	n. d.	3.92	5.80	5.11	4.01	n. d.						101.79	
3 D4. V	53.20	24.16	7.07	n. d.	2.20	6.38	4.44	3.21	n. d.						100.16	
4 D4. V	53.00	22.63	7.50	n. d.	2.47	7.14	1.72	5.89	n. d.						100.60	
5 D4. V	52.80	21.95	10.96	n. d.	3.06	7.05	4.37	2.39	n. d.						102.58	
6 D2. V	54.48	21.67	1.21	2.77	1.44	5.05	7.43	4.65	2.66			0.38	trace		102.02	
7 B3. IV	47.00	17.86	4.85	4.02	1.10	5.30	6.84	4.55	1.53	1.10	4.80	trace	0.32	1.25	100.52	2.492
8 D3. V	47.71	9.37	5.31	9.53	7.06	15.13	2.21	1.01	0.41				trace	0.81	100.67	2.992 26°
9 D4. V	46.72	19.50	3.03	5.02	4.41	16.28	2.09	1.24	1.13				0.73	0.37	100.52	3.012 26°
10 D3. V	45.37	14.11	5.06	7.08	7.56	17.11	1.34	0.62	0.65				0.28	0.26	100.74	2.574 26°
11 D3. V	42.78	11.07	17.07	5.51	4.23	12.57	1.11	0.72	4.02				0.31	0.42	100.33	
12 D3. V	42.63	18.91	5.06	9.16	3.60	12.11	2.66	1.35	2.12				0.34	0.36	100.37	2.538 26°
13 D3. V	42.16	16.25	3.02	9.03	3.11	10.05	2.13	7.06	2.13				0.26	0.72	100.03	2.615 26°

LEUCITE-PLAGIOCLASE ROCKS, ETC.—Continued.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Lava of Oct., 1822, Mt. Vesuvius, Italy.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 475, 1887.	Obsidian.	
Cl	trace	Mt. Vesuvius, Italy.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 486, 1887.	Leucite-tephrite.	
		Volcanello, Æolian. Islands, Italy.	H. Bäckström.	H. Bäckström, G. F. F., XVIII, p. 159, 1896.	Leucite-basanite.	
		Pangkadjene, South Celebes.	W. Bruhns.	H. Bücking, Ber. Nf. Ges. Freib., XI, p. 83, 1899.	Biotite-leucite-basalt.	
		El Capitan, Canbeligo County, New South Wales.	J. C. H. Mingaye.	David and Anderson, Rec. G. S. N. S. W., I, p. 156, 1890.	Leucite-basalt.	
		Byrock, New South Wales.	J. C. H. Mingaye.	David and Anderson, Rec. G. S. N. S. W., I, p. 156, 1890.	Leucite-basalt.	

HAUYNOPHYRE, ETC.

Inclusive.		Locality.	Analyst.	Reference.	Author's name.	Remarks.
		Aiguille de Güery, Mt. Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Haüyne-tephrite.	Not fresh.
SO_3	trace	La Quenille, Mt. Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Haüyne-tephrite.	
SO_3	0.50	Roc Blanc, Mt. Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Haüyne-tephrite.	
SO_3	0.25	Roc Blanc? Mt. Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Haüyne-tephrite.	Not fresh.
		Roc Blanc? Mt. Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Haüyne-tephrite.	
SO_3 Cl	0.21 0.07	Hohenstein, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XIX, p. 82, 1900.	Sodalite-tephrite.	
Cl	trace	Königsbachthal, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIX, p. 76, 1900.	Sodalite-porphyry.	Cl low.
SO_3	2.12	Summit, Mte. Vulture, Italy.	L. Ricciardi.	L. Ricciardi, Gazz. Chim. Ital., XVII, p. (7), 1887.	Lava.	Alkalies low.
		Mte. Vulture, Italy.	L. Ricciardi.	L. Ricciardi, Gazz. Chim. Ital., XVII, p. (5), 1887.	Lava.	Alkalies low.
SO_3	1.30	Mte. Vulture, Italy.	L. Ricciardi.	L. Ricciardi, Gazz. Chim. Ital., XVII, p. (6), 1887.	Lava.	Alkalies low.
SO_3	0.52	Mte. Vulture, Italy.	L. Ricciardi.	L. Ricciardi, Gazz. Chim. Ital., XVII, p. (7), 1887.	"Oolitic rock" (lava).	Alkalies low.
SO_3	2.07	Melfi, Mte. Vulture, Italy.	L. Ricciardi.	L. Ricciardi, Gazz. Chim. Ital., XVII, p. (10), 1887.	Hauynophyre.	Alkalies low.
SO_3	4.11	Melfi, Mte. Vulture, Italy.	L. Ricciardi.	L. Ricciardi, Gazz. Chim. Ital., XVII, p. (9), 1887.	Hauynophyre.	Alkalies?

HAUYNOPHYRE, ETC.—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
14 D3. V	41.77	14.05	4.21	11.03	3.40	12.52	6.23	1.38	1.80				trace	1.23	100.27	
15 D3. V	39.74	10.27	6.07	13.11	4.18	19.11	3.12	0.63	0.50				0.41	0.63	101.03	2.630 26°
16 D3. V	36.35	12.37	5.26	11.71	7.46	16.82	2.07	1.38	4.11				0.63	0.42	100.80	2.840 26°

IJOLITE, ETC.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 D4. V	45.18	23.31	6.11	n. d.	1.45	4.62	11.17	5.95	1.14						98.93	
2 D2. V	46.63	15.03	5.91	5.09	3.47	11.23	8.16	1.96	0.35			1.12		trace	98.95	
3 D2. V	42.79	19.89	4.39	2.33	1.87	11.76	9.31	1.67	0.99			1.70	1.70	0.41	98.81	

MELILITE ROCKS.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A3. III	35.91	11.51	2.35	5.38	17.54	13.57	1.75	2.87	9.40			0.23	n. d.		100.51	
2 B3. IV	35.25	6.10	8.53	5.60	20.40	7.40	0.70	2.88	10.15			2.25			99.26	
3 C3. V	33.10	7.88	16.71	1.48	13.42	5.25	0.23	0.29	17.85			2.90			99.11	
4 B2. III	35.54	11.72	5.86	5.99	13.56	15.83	1.91	2.24	1.67		4.30	2.03	0.32		100.97	3.052
5 A2. II	33.87	15.25	2.37	5.15	12.52	14.43	1.41	1.02	2.47		8.64	2.12	0.99	0.32	100.36	3.033
6 A2. II	30.69	10.48	5.76	7.47	11.10	13.25	1.41	1.82	2.88	—	8.21	5.52	0.64	0.55	99.78	
7 A2. II	29.25	8.80	3.92	5.42	17.66	17.86	0.77	2.45	2.61		6.00	2.54	2.86	trace	100.14 (100.04)	
8 C2. IV	24.19	12.00	6.45	9.32	14.07	17.37	1.99	3.06	5.16	—	2.77	trace	3.96	trace	101.16	3.15
9 B4. V	33.89	9.93	15.63	n. d.	16.14	15.19	2.86	n. d.	2.90		1.41	0.64	1.41	trace	100.00	
10 D4. V.	43.36	9.37	8.88	n. d.	10.42	15.38	1.49	3.21	6.66				trace		98.77	

HAUYNOPHYRE, ETC.—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 2.65	Mte. Vulture, Italy.	L. Ricciardi.	L. Ricciardi, Gazz. Chim. Ital., XVII, p. (8), 1887.	Tuff.	Alkalies?
SO_3 8.26	Melfi, Mte. Vulture, Italy.	L. Ricciardi	L. Ricciardi, Gazz. Chim. Ital., XVII, p. (9), 1887.	Hauynophyre.	Alkalies low.
SO_3 2.12	Mte. Vulture, Italy.	L. Ricciardi.	L. Ricciardi, Gazz. Chim. Ital., XVII, p. (6), 1887.	Lava.	Alkalies low.

IJOLITE, ETC.

	Beemerville, Sussex County, New Jersey.	F. W. Love?	J. F. Kemp, Tr. N. Y. Ac. Sci., XI, p. 67, 1892.	Nephelite-porphyry (sussexite).	
	Kaljokthal, Kola, Finland.	H. Berghell.	V. Hackman, Fennia, XI, No. 2, p. 185, 1894.	Ijolite.	
	Iiwaara, Kola, Finland.	H. Berghell.	Ramsay and Berghell, G. F. F., XIII, p. 302, 1891.	Ijolite.	

MELILITE ROCKS.

	St. Anne de Bellevue, n. Montreal, Canada.	P. H. le Rossignol.	F. D. Adams, A. J. S., XLIII, p. 271, 1892.	Alnöite.	Not fresh.
	Manheim, Herkimer County, New York.	C. H. Smyth, jr.	C. H. Smyth, jr., B. G. S. A., IX, p. 262, 1898.	Alnöite.	Not fresh.
	Manheim, Herkimer County, New York.	C. H. Smyth, jr.	C. H. Smyth, jr., B. G. S. A., IX, p. 262, 1898.	Alnöite.	Much weathered.
	Naversdale, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edinb., XXXIX, pt. 4, p. 897, 1900.	Alnöite.	Not fresh.
	Long Geo, Holm, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edinb., XXXIX, pt. 4, p. 898, 1900.	Melilite-monchiquite.	Not fresh.
	Storkalfven, Rödö, Sweden.	H. Santesson.	P. J. Holmquist, Afh. Sver. G. Und., No. 181, p. 86,1899.	Alnöite.	Not fresh. Dried at 110°.
	Norrwik, Alnö, Sweden.	N. Sahlbom.	N. Sahlbom, N. J., 1897, II, p. 100.	Alnöite.	Not fresh. 0.25 F (calc.). omitted.
Cl 0.53 S 0.29 Cr_2O_3 trace	Stornaset, Alnö, Sweden.	F. Berwerth.	Raimann and Berwerth, Ann. K. K. Nh. Hof. Mus., X, p. 76, 1895.	Alnöite.	Not fresh. Dried at 130°.
S trace Cr_2O_3 trace	Hochbohl, Owen, Wurtemberg.	J. Meyer.	A. Stelzner, N. J. B. B., II, p. 398, 1883.	Melilite-basalt.	Not fresh. Calc. from Sol. and Insol.
	Mte. Terminillo, Rieti, Italy.	L. Brugnatelli.	L. Brugnatelli, B. Com. G. Ital., XIV, p. 318, 1883.	Melilite-pyroxene rock.	

LIMBURGITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 A2. II.	36.80	4.16	n. d.	8.33	25.98	8.63	0.17	2.48	6.93	0.51	2.95	1.26	0.47	0.13	100.22	
2 D4. V	44.47	10.97	n. d.	13.08	6.24	12.66	4.58	1.68	2.27		none	3.56		trace	101.70	
3 B4. V	43.33	11.06	n. d.	15.25	6.24	12.66	4.58	1.68	1.43		none	4.63		trace	100.86	
4 B4. V	42.61	11.55	n. d.	12.27	12.10	13.43	1.06	2.80	——			4.33			100.15	
5 B4. V	40.48	8.93	20.05	n. d.	11.12	13.03	2.05	1.26	3.37						100.29	2.931
6 C4. V	42.30	12.74	10.60	n. d.	12.74	13.01	2.65	0.94	2.54			1.51			99.03	
7 B4. V	39.07	13.70	20.92	n. d.	6.90	10.04	2.68		3.53		2.46	0.21	0.52	0.55	100.89	
8 D4. V	53.92	17.98	n. d.	4.88	4.57	7.59	3.92	1.14	4.64	——					98.64	
9 B3. IV	39.32	17.53	3.07	9.12	8.00	10.38	2.44	2.04	5.10	2.20					99.20	

PYROXENITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 D4. V	43.35	29.75	5.61	n. d.	2.03	12.46	trace	5.93	0.73						99.86	
2 B4. IV	54.12	7.91	n. d.	12.87	16.64	6.21	0.44	1.19	n. d.						99.38	3.30
3 C4. V	46.86	9.80	16.35	n. d.	18.08	9.57	trace	trace	0.67						101.33	3.333

PERIDOTITE.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
1 D4. V	20.85	5.55	45.62		16.45	0.73	n. d.	n. d.	n. d.			9.93	trace		99.60	
2 D4. V	37.44	28.60	11.92	n. d.	1.97	5.45	0.97	1.02	12.67						100.04	
3 D4. V	33.80	6.84	12.26	n. d.	21.38	9.50	n. d.	n. d.	15.20						98.98	2.732
4 D3. V	41.00	7.58	5.99	4.63	23.59	10.08	0.52	n. d.	4.73		3.62			trace	101.74	2.989
5 A2. II	34.50	14.37	2.85	4.46	21.81	11.43	0.51	1.50	7.14		0.21		0.77		100.15	

LIMBURGITE.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.06 S 0.95 NiO 0.09 BaO 0.12 SrO trace	Syracuse, New York.	H. N. Stokes.	Darton and Kemp, A. J. S., XLIX, p. 461, 1895.	Limburgite.	Not fresh.
	Wesenweiler, Kaiserstuhl, Baden.	A. Knop.	A. Knop, Der Kaiserstuhl, Leipzig, 1892, p. 283.	Limburgite.	MgO, CaO, Na_2O, and K_2O?
	Eichelspitze, Kaiserstuhl, Baden.	A. Knop.	A. Knop, Der Kaiserstuhl, Leipzig, 1892, p. 281.	Limburgite.	MgO, CaO, Na_2O, and K_2O?
	Limburg, Kaiserstuhl, Baden.	A. Knop.	A. Knop, Der Kaiserstuhl, Leipzig, 1892, p. 296.	Limburgite.	Not fresh. 2.11 H_2O. Ignited before analysis.
	Kaiserstuhl, Baden.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 479, 1887.	Limburgite.	
	Reichenweier, Vogesen, Elsass.	G. Linck.	G. Linck, Mt. Com. G.-L. U. Es., I, p. 60, 1887.	Limburgite.	
SO_3 0.18 Cl 0.13 F trace	Pardubic, Bohemia.	F. Kovar.	F. Kovar, Cf. G. Cb., I, p. 514, 1901.	Limburgite.	
	Chichishima, Bonin Islands, Japan.	J. Petersen.	J. Petersen, Jb. Hamb. Wiss. Anst., VIII, p. 30, 1891.	Boninite (bronzite-limburgite).	Al_2O_3 high.
	Bendigo, Victoria, Australia.	A. W. Howitt.	A. W. Howitt, Cf. N. J., 1894, II, p. 271.	Limburgite.	

PYROXENITE.

	Rosetown, West of Stony Point, New York.	J. F. Kemp?	J. F. Kemp, A. J. S., XXXVI, p. 250, 1888.	Hornblende-augite rock.	Al_2O_3 high. MgO low.
	Jackass Creek, Montana.	G. P. Merrill.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 662, 1895.	Websterite.	
	Pallavaram, Madras, India.	T. L. Walker.	T. H. Holland, Mem. G. S. Ind., XXVIII, p. 166, 1900.	Hypersthenite.	

PERIDOTITE.

S trace	Iron Mine Hill, Cumberland, Rhode Island.	T. Drown.	M. E. Wadsworth, Lithol. Stud., 1884, p. XVI.	Cumberlandite.	
	Ithaca, New York.	W. H. Morrison.	J. F. Kemp, A. J. S., XLII, p. 412, 1891.	Peridotite.	Not fresh.
	Manheim, Herkimer County, New York.	C. W. Smith, jr.	C. H. Smyth, jr., A. J. S., XLIII, p. 325, 1892.	Peridotite.	Not fresh.
	Pikesville, Baltimore County, Maryland.	L. McCay.	G. H. Williams, B. U. S. G. S., 28, p. 54, 1886.	Peridotite.	Feldspathic. Not fresh.
SO_3 0.60	Marion, Crittenden County, Kentucky.	L. G. Eakins.	J. S. Diller? B. U. S. G. S., 148, p. 94, 1897.	Mica-peridotite.	Not fresh. Not described.

PERIDOTITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
6 A1. I	29.81	2.01	5.16	4.35	32.41	7.69	0.11	0.20	8.92		6.66	2.20	0.35	0.23	100.86	2.781
7 A2. II	29.43	2.36	n. d.	9.06	31.66	6.94	0.78	0.65	10.90		5.65	1.48	trace		100.15	2.697
8 A4. IV	42.71	0.70	n. d.	6.83	41.18	n. d.	n. d.	n. d.	8.38					0.09	100.21	3.10
9 A1. I	37.36	4.76	6.61	6.12	31.11	1.19	trace	trace	10.37	0.65	none	0.79	0.06	trace	99.68	
10 D3. V	43.65	6.81	15.94	5.14	12.91	4.86	0.43	0.52	7.46		1.12				98.84	
11 B4. V	46.35	16.41	n. d.	9.91	18.72	6.14	n. d.	n. d.	3.01						100.54	3.21
12 B4. V	47.41	16.03	2.66	7.05	5.81	12.33	4.47	as Na_2O	2.19			1.29		trace	99.24	2.96
13 A1. I	44.81	1.88	1.98	4.52	30.91	6.58	0.15		6.88	0.15	1.79	none	0.02	0.13	100.18	
14 D4. V	42.10	3.28	8.27	2.13	30.65	3.77	1.90		7.73					0.70	100.53	2.82
15 B3. IV	38.6	3.7	7.6	7.8	27.7	7.7	none	0.2	6.4						99.8	3.00
16 C3. V	37.8	9.7	3.4	7.0	22.9	4.1	0.8	trace	14.0						99.7	
17 A4. IV	49.10	8.48	5.79	n. d.	20.85	12.90	1.67	0.56	0.23					trace	100.15	
18 A2. II	38.35	7.03	6.82	8.68	25.69	0.12	0.40	0.45	10.89			0.90	0.12		99.67	2.73
19 A4. V	39.42	1.62	4.70	4.73	34.19	1.56	n. d.	n. d.	12.29		0.37			0.89	100.23	2.86
20 D2. V	38.82	0.39	3.32	4.08	43.45	trace	0.08	0.09	8.47		1.13	0.15			103.41 (100.04)	2.819
21 D3. V	41.35	13.90	8.24	7.13	8.79	11.65	0.15	0.16	5.35		2.70		0.22		99.64	
22 B3. IV	40.65	12.85	4.88	8.30	18.05	8.05	1.38	0.91	2.70		2.30		0.64		100.71	
23 D3. V	39.75	14.40	7.58	8.57	6.17	12.65	0.81	0.28	2.15		6.50		0.71		99.57	
24 D3. V	39.05	13.95	8.16	6.25	8.89	14.02	0.55	0.89	2.95		5.10		0.55		100.36	

PERIDOTITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
SO_3 0.28 Cr_2O_3 0.43 NiO 0.05	Willard, Elliott County, Kentucky.	T. M. Chatard.	J. S. Diller, A. J. S., XXXII, p. 125, 1886.	Peridotite.	Not fresh. Also in B. U. S. G. S. 38, p. 24, 1887.
SO_3 0.30 S 0.20 Cr_2O_3 0.14 NiO 0.60	Near Willard, Elliott County, Kentucky.	Peter and Kastle.	J. S. Diller, B. U. S. G. S., 38, p. 24, 1887.	Peridotite.	Not fresh.
Cr_2O_3 trace NiO 0.32	Laurel Creek, Rabun County, Georgia.	W. H. Emerson.	F. P. Klug, B. G. S. Georg., No. 2, p. 81, 1894.	Dunite.	Not fresh.
Cr_2O_3 0.62 NiO 0.04	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, M. U. S. G. S., XXXVI, p. 219, 1899.	Picrite-porphyry.	Not fresh.
	Near Morton, Minnesota River, Minnesota.	A. D. Meeds.	C. W. Hall, B. U. S. G. S., 157, p. 113, 1899.	Saxonite.	Not fresh.
	Between North and South Meadow creeks, Montana.	G. P. Merrill.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 656, 1895.	Saxonite.	Al_2O_3 high?
	The Potrero, San Francisco, California.	C. Palache.	C. Palache, B. Dep. G. Un. Cal., I, p. 177, 1894.	Lherzolite.	
Cr_2O_3 0.29 NiO 0.09 BaO none SrO none	Near Strawberry Valley, Butte County, California.	W. F. Hillebrand.	H. W. Turner, J. G., III, p. 403, 1895.	Peridotite.	Not fresh. Also in 17 A. R. U. S. G. S., I, p. 735, 1896.
	Caithness, Scotland.	H. R. Mill.	J. W. Judd, Q. J. G. S., XLI, p. 402, 1885.	Scyelite.	Not fresh. From 3 poor partial analyses.
Cr_2O_3 0.1	Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 145, 1892.	Olivine-diallage rock.	Not fresh.
	Firth of Forth, Scotland.	T. Waller.	J. W. Judd, Q. J. G. S., XLI, p. 400, 1885.	Picrite.	Not fresh. Al_2O_3 high.
Cr_2O_3 0.57	Tuc d'Ess, Pyrenees.	Strvesco.	A. Lacroix, cf. N. J., 1895, II, p. 267.	Lherzolite.	
SO_3 0.22	Stoppenberg, Harz Mountains.	K. Hampe.	K. A. Lossen, Z. D. G. G., XL, p. 372, 1888.	Paleopikrite.	Not fresh.
Cr. Spinel 0.47	Költschenberg, Silesia.	H. Traube.	H. Traube, cf. N. J., 1885, I, p. 241.	Olivine-diallage rock.	Not fresh.
SO_3 trace Cr_2O_3 3.82 Org 0.11	Habendorf, Silesia.	K. Hampe.	E. Dathe, Jb. Pr. G. L-A., IX, p. 327, 1889.	Peridotite.	Sum uncertain. Not fresh.
	Stranik, Hotzendorf, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. Wien. G. R-A., XXX, p. 76, 1896.	Picrite.	MgO low. Not fresh.
	Sohle, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. Wien. G. R-A., XXX, p. 76, 1896.	Picrite-porphyry.	Not fresh.
	Near Mtschenowitz, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. Wien. G. R-A., XXX, p 75, 1896.	Picrite.	MgO low. Not fresh.
	Zamrsk, n. Keltsch, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. Wien. G. R-A., XXX, p. 74, 1896.	Picrite.	MgO low. Not fresh.

PERIDOTITE—Continued.

No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	CO_2	TiO_2	P_2O_5	MnO	Sum	Sp. gr.
25 C4. V	38.72	2.55	4.50	3.76	41.36	n. d.	0.57	n. d.	7.70						99.16	
26 B4. V	40.30	9.45	7.30	n. d.	21.20	3.48	4.93	0.90	16.00						100.56	
27 D4. V	34.80	in FeO.	n. d.	14.40	30.76	2.70	1.40	n. d.	10.60		5.55	in SiO_2.			100.21	2.67
28 D4. V	33.00	in FeO.	n. d.	12.00	32.38	9.60	0.67	n. d.	6.00		7.05	in SiO_2			100.70	2.734
29 C4. V	43.84	1.14	8.76	n. d.	44.33	1.71	n. d.	n. d.	1.06					0.12	101.38	3.287

PERIDOTITE—Continued.

Inclusive.	Locality.	Analyst.	Reference.	Author's name.	Remarks.
	Solwa-Supreya, Ural Mountains, Russia.	Krekmeyer.	Loewinson-Lessing, G. Sk. Jushno. Dorpat, 1900, p. 166.	Dunite.	Not fresh.
	Kimberley, Griqualand, South Africa.	Not stated.	L. de Launay, C. R., CXXV, p. 336, 1897.	Peridotite breccia.	Not fresh.
	Kimberley, Griqualand, South Africa.	H. C. Lewis.	H. C. Lewis, Gen. of the Diamond, London, 1897, p. 47.	Kimberlite.	Not fresh.
	Kimberley, Griqualand, South Africa.	H. C. Lewis.	H. C. Lewis, Gen. of the Diamond, London, 1897, p. 47.	Kimberlite.	Not fresh.
Cr_2O_3 0.42 NiO 0.51	St. Paul's Rocks, Atlantic Ocean.	Sipöcz.	Cf. J. J. H. Teall, Brit. Petr., London, 1888, p. 103.	Saxonite.	

GLOSSARY OF NEW TERMS EMPLOYED IN THIS PAPER.[a]

A.

Actual mineral composition. The composition of a rock in terms of the minerals actually present, expressed quantitatively.

Alferric. Having the characteristics of, or belonging to, the group of aluminous ferromagnesian and calcic silicates.

Alkalicalcic. Having salic alkalies and salic lime present in equal or nearly equal amounts.

Alkalimirlic. Having femic alkalies and magnesia, ferrous iron, and femic lime in equal or nearly equal amounts.

C.

Calcimiric. Equally calcic and miric, or nearly so.

Class. Division of igneous rocks based on the relative proportions of salic and femic standard minerals.

D.

Do- (or **Dom-**). Prefix indicating that one factor dominates over another within the ratios $\frac{7}{1}$ and $\frac{5}{3}$.

Docalcic. Dominantly calcic. Of salic minerals when CaO' dominates over $K_2O'+Na_2O'$; of femic minerals when CaO'' dominates over $MgO+FeO$.

Dofelic. Dominantly felic, having normative feldspar dominant over normative quartz or lenads.

Dofemic. Dominantly femic, having femic minerals dominant over salic.

Doferrous. Dominantly ferrous, having FeO dominant over MgO.

Dohemic. Dominantly hemic, having hemic minerals (magnetite, hematite) dominant over the tilic minerals (titanite, ilmenite, perofskite, rutile).

Dolenic. Dominantly lenic, having the lenads (leucite, nephelite, the sodalites) dominant over feldspar.

Domagnesic. Dominantly magnesic, having MgO dominant over FeO.

Domalkalic. Dominantly alkalic. Of salic minerals when $K_2O' + Na_2O'$ dominates over CaO'; of femic minerals when $K_2O'' + Na_2O''$ dominates over $MgO + FeO + CaO''$.

Dominant. Said of a factor which dominates over another within the ratios $\frac{7}{1}$ and $\frac{5}{3}$. Used in connection with a fivefold comparison.

Domiric. Dominantly miric, having $MgO + FeO$ dominant over CaO''.

Domirlic. Dominantly mirlic, having $MgO + Feo + CaO''$ dominant over $K_2O'' + Na_2O''$.

Domitic. Dominantly mitic, having mitic minerals (magnetite, hematite, ilmenite, etc.) dominant over polic minerals (pyroxene, olivine, akermanite).

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[a] The definitions here given are, for the most part, selected from those to be found in the glossary of Quantitative Classification of Igneous Rocks, by Cross, Iddings, Pirsson, and Washington, Chicago, 1903. Magmatic rock names are not included, but will be found in a separate index.

Domolic. Dominantly olic, having normative olivine and akermanite dominant over normative pyroxenes.

Dopolic. Dominantly polic, having polic minerals (pyroxene, olivine) dominant over mitic minerals (magnetite, ilmenite, etc.).

Dopotassic. Dominantly potassic, having K_2O dominant over Na_2O.

Dopyric. Dominantly pyric, having normative pyroxene dominant over normative olivine and akermanite.

Doquaric. Dominantly quaric, having normative quartz dominant over normative feldspar.

Dosalic. Dominantly salic, having salic minerals dominant over femic.

Dosodic. Dominantly sodic, having Na_2O dominant over K_2O.

Dotilic. Dominantly tilic, having tilic minerals (titanite, ilmenite, etc.) dominant over hemic minerals (magnetite, hematite).

E.

Extreme. Said of a factor that is present alone or in amount greater than $\frac{7}{1}$ of the other factor.

F.

Fel. Syllable mnemonic of feldspar.

Felic. Having the properties of, or containing, normative feldspars.

Fem. Term mnemonic of the second group of standard minerals, including nonaluminous ferromagnesian and calcic silicates, silicotitanates, and nonsiliceous and nonaluminous minerals.

Femic. Having the character of, or belonging to, the second (fem) group of standard minerals.

Ferrosilite. Name given to the ferrous hypersthene molecule, $FeSiO_3$.

G.

Grad. Division of subrang based on the proportions of minerals of the subordinate group of standard minerals when present in notable amount.

H.

Habit. Resemblance in general appearance, both in texture and mode.

Hem. Syllable mnemonic of hematite and magnetite.

Hemic. Having the character of, or containing, the minerals hematite and magnetite.

I.

Inferior. Adjective applied to analyses of the last two ratings: that is, either poor or bad.

L.

Len. Syllable mnemonic of leucite and nephelite, including sodalite and noselite.

Lenad. One of the standard minerals, leucite, nephelite, sodalite, noselite. Equivalent to eldspathoid (French feldspathide).

Lenadic. Having the character of, or belonging to, the lenads.

Lendofelic. Having normative feldspars dominant over lenads.

Lenfelic. Having normative feldspars and lenads in equal, or nearly equal, amounts.

M.

Magnesiferrous. Equally magnesic and ferrous, or nearly so.

Mir. Syllable mnemonic of magnesia and ferrous iron.

Miric. Characterized by the presence of MgO or FeO, or both. Opposed to calcic.

Mirl. Syllable mnemonic of magnesia, ferrous iron, and lime.

Mirlic. Characterized by the presence of MgO, FeO, and CaO''. Opposed to femic alkalic.

Mit. Syllable mnemonic of magnetite, ilmenite, and titanite, and including all the minerals of the second subgroup of femic minerals.

Mitic. Having the characters of the above-mentioned minerals.

Modal. Relating to the mode.

Mode. The actual mineral composition of a rock. Opposed to norm, with which it may or may not coincide.

N.

Negligible. Term applied to the amount of any chemical or mineral factor when it is less than one-eighth of the group of factors under consideration.

Norm. The standard mineral composition of a rock; that is, the chemical composition expressed in terms of standard minerals. Opposed to mode, with which it may or may not coincide.

Normative. Relating to the norm. That which makes up the norm.

Notable. Term applied to the amount of any chemical or mineral factor when it is greater than one-eighth of the group of factors under consideration.

O.

Ol. Syllable mnemonic of olivine, including also akermanite.

Olic. Having the properties of, or containing, normative olivine or akermanite.

Order. A division of subclass based on the relative proportions of the standard mineral subgroups in the preponderant group.

P.

Per-. Prefix to indicate that a factor is present alone or in extreme amount; that is, that its ratio to another factor is $>\frac{7}{1}$.

Peralkalic. Extremely alkalic. Of salic minerals when $K_2O'+Na_2O'$ is extreme over CaO'; of femic minerals when $K_2O''+Na_2O''$ is extreme over $MgO+FeO+CaO''$.

Percalcic. Extremely calcic. Of salic minerals when CaO' is extreme over $K_2O'+Na_2O'$; of femic minerals when CaO'' is extreme over $MgO+FeO$.

Perfelic. Extremely felic, with normative feldspar extreme over normative quartz or lenads.

Perfemic. Extremely femic, having the femic minerals extreme over the salic.

Perferrous. Extremely ferrous, having FeO extreme over MgO.

Perhemic. Extremely hemic, having hemic minerals (magnetite, hematite) extreme over the tilic minerals (ilmenite, titanite, etc.).

Perlenic. Extremely lenic, having lenic minerals (leucite, nephelite, sodalite, noselite) extreme over the felic minerals (feldspars).

Permagnesic. Extremely magnesic, having MgO extreme over FeO.

Permiric. Extremely miric, having $MgO+FeO$ extreme over CaO''.

Permirlic. Extremely mirlic, having $MgO+FeO+CaO''$ extreme over $K_2O''+Na_2O''$.

Permitic. Extremely mitic, having mitic minerals (magnetite, ilmenite, hematite, etc.) extreme over the polic minerals (pyroxene, olivine, akermanite).

Perolic. Extremely olic, having olic minerals (olivine, akermanite) extreme over the pyric minerals (pyroxenes).

Perpolic. Extremely polic, having polic minerals (pyroxenes, olivine, akermanite) extreme over the mitic minerals (magnetite, hematite, ilmenite, etc.).

Perpotassic. Extremely potassic, having K_2O extreme over Na_2O.

Perpyric. Extremely pyric, having the pyric minerals (pyroxenes) extreme over the olic minerals (olivine, akermanite).

Perquaric. Extremely quaric, having normative quartz extreme over normative feldspar.

Persalic. Extremely salic, having salic minerals extreme over the femic.

Persodic. Extremely sodic, having Na_2O extreme over K_2O.

Pertilic. Extremely tilic, having tilic minerals (ilmenite, titanite, etc.) extreme over the hemic minerals (magnetite, hematite).

Pol. Syllable mnemonic of the femic silicates, pyroxene and olivine, including akermanite.

Polic. Characterized by the presence of the femic silicates.

Polmitic. Having equal, or nearly equal, amounts of the polic and mitic minerals.

Pre-. Prefix indicating the predominance of one factor over another in a ratio $> \frac{5}{3}$.

Prealkalic. Predominantly alkalic. Of salic minerals when $K_2O' + Na_2O'$ predominates over CaO'; of femic minerals when $K_2O'' + Na_2O''$ predominates over $MgO + FeO + CaO''$.

Precalcic. Predominantly calcic. Of salic minerals when CaO' predominates over $K_2O' + Na_2O''$; of femic minerals when CaO'' predominates over $MgO + FeO$.

Predominant. Said of a factor which preponderates over another in a ratio greater than $\frac{5}{3}$. Used in connection with a threefold comparison.

Prepotassic. Predominantly potassic, having K_2O predominant over Na_2O.

Presodic. Predominantly sodic, having Na_2O predominant over K_2O.

Pyr. Syllable mnemonic of pyroxenes.

Pyric. Characterized by the presence of normative pyroxene.

Pyrolic. Having equal or nearly equal amounts of normative pyroxene and olivine or akermanite.

Q.

Quar. Syllable mnemonic of quartz.

Quardofelic. Having felic minerals (feldspar) dominant over normative quartz.

Quarfelic. Having equal, or nearly equal, amounts of normative quartz.

Quaric. Characterized by the presence of normative quartz.

R.

Rang. A division of order based on the character of the chemical bases in the preponderant group of standard minerals.

Rating. The relative standing of an analysis, based on its accuracy and completeness.

S.

Sal. Syllable mnemonic of the silico-aluminous nonferromagnesian group of standard minerals, including quartz, feldspars, lenads, corundum, and zircon.

Salfemic. Having salic and femic minerals in equal, or nearly equal, amounts.

Salic. Having the characters of, or belonging to, the first (sal) group of standard minerals.

Section. Subdivision of any of the other taxonomic divisions from class to subgrad.

Standard mineral. One of the minerals or mineral molecules selected to express the chemical composition of an igneous rock.

Standard mineral composition. The composition of a rock expressed in terms of the standard minerals as calculated from the chemical analysis.

Subclass. Division of class based on certain broad chemical differences in the preponderant standard mineral group.

Subgrad. Division of grad, based on the chemical character of the minerals used in forming the grad.

Suborder. Division of order, based on certain chemical differences in the preponderant mineral group.

Subrang. Division of rang, based on the character of the chemical bases in the preponderant mineral subgroup used in forming rang.

Superior. Adjective applied to analyses of the first three ratings; that is, either excellent, good, or fair.

T.

Til. Syllable mnemonic of the titaniferous femic minerals, titanite and ilmenite, including perofskite and rutile.

Tildohemic. Having hemic minerals (magnetite, hematite) dominant over the tilic minerals (ilmenite, titanite, etc.).

Tilhemic. Having equal, or nearly equal, amounts of hemic and tilic minerals.

Tilic. Having the characters of, or pertaining to, the titaniferous femic minerals.

Type. A rock which forms a standard by which to indicate identity in norm, mode, and texture, or a close approximation to identity.

V.

Varietal. Having the character of, or producing, a variety of a mode.

Variety. A division of a mode, recognizing the presence of subordinate mineral components.

PREFATORY NOTE TO INDEXES.

For the information of those who may use the following indexes a few words of explanation are here presented.

It must be borne in mind, both here and throughout the tables, that the opposite pages belong and are to be considered together. Reference to an even-numbered page implies, therefore, the opposite odd-numbered one, and vice versa. Similarly the divisions of the new system, and the names, although placed for typographical reasons on one page or the other, apply to both. Thus, liparase on page 144 and liparose on page 145 are to be taken together.

It will be convenient to remember that Part I, which contains the superior analyses, ends with page 369, while Part II, in which are found the inferior analyses and those of tuffs, etc., begins with page 372. This is shown in the indexes by semicolons, marking the division.

In the index to old names, mineral qualifiers have been omitted in most cases, especially when the mineral name indicates no special magmatic character. Thus biotite-andesite, hornblende-andesite, and hypersthene-andesite are to be looked for under andesite. When, however, the mineral qualifier indicates a distinctive magmatic character it will be given, as in the case of nephelite-syenite, quartz-basalt, quartz-diorite, or if its presence is of special interest, as in cordierite-andesite, analcite-tinguaite. As a rule, however, the small rock groups are not thus distinguished. Textural qualifiers are also usually omitted, as in andesite-porphyry, which will be found under andesite, though granite-porphyry, diorite-porphyry, etc., are retained. Tuffs will be found under their respective rocks.

In using this index it must also be borne in mind that many synonyms are in use, so that liparites may be found under rhyolite, dolerites under basalt, etc. The terms porphyry and porphyrite are also frequently interchanged, as usage is not uniform.

In the index to localities the primary arrangement is by countries and separate islands, etc. Under countries the arrangement is by States or provinces, etc. Thus under Great Britain will be found England, Ireland, etc. This has not been done in the case of small countries or those represented by few analyses. In Germany a number of well-defined mountainous regions are given separately when they extend into more than one province, as the Harz Mountains. On the other hand, the rocks of the Odenwald, for instance, will be found under Hesse, and those of the Schwarzwald and the Kaiserstuhl under Baden. Islands near the coast of a country to which they belong are listed separately, under the head of the country, as with the Æolian and Orkney Islands. Colonies are, of course, given a separate head, as with Algeria. In view of the very large number of localities, it was not deemed expedient to index the exact locality names. But by comparing the indexes of either the new or the old rock names with that of localities, the reference to any desired rock will usually be readily found.

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